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Economic analysis of animal health systems and their implications for public health:

From funding mechanisms to service delivery

Ana Riviere-Cinnamond

Ph.D

2007

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Acknowledgements

I would like to express my most sincere gratitude to:

- Joachim Otte, and the Pro-Poor Livestock Policy Initiative (PPLPI) team, as well as to the staff in the Department for Animal Production and Health (AGA) at the Food and Agriculture Organisation;

- Andy Catley, and the African Union's Community-based Animal Health and Epidemiology Unit (CAPE) in Nairobi, as well as the research team members (M. Eregae and N. Simiu) without whom the data collection would not have been possible; and

- Anni McLeod and the Government of Vietnam,

for being so supportive and helping to make this thesis possible.

I am grateful to all those who contributed with inputs directly or indirectly to the thesis.

I am indebted to my supervisor J.A Roberts.

To my parents.
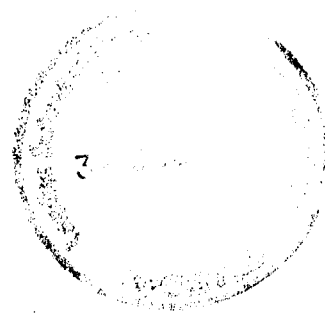
Abstract

Epidemic disease outbreaks of zoonotic origin such as Avian Influenza, SARS or BSE are increasingly common lately. The thesis aims at exploring the underlying reasons for risks occurrence in the public health sector due to the increase in animal production. It adopts an economic perspective and compares human health systems and animal health systems. A comparative literature review is undertaken of animal health and its human health counterpart

It explores the underlying economic reasons for the weakening of public health and animal health systems. The role of the structural adjustment programmes, followed by market-based economic principles (especially privatisation of public services) is analysed. The market failures existing in this field are examined along with associated policy implications.

Characteristic of the thesis is the underlying comparison of human and animal health systems from the funding mechanism to service delivery. In the latter case, community-based systems in both the human and animal fields are chosen as a comparative case-study.

Hence, the thesis presents first, the possible options to fund activities in the animal health field to prevent the spread of such types of diseases. The recent Avian Influenza outbreak in Vietnam (2004-2005) is taken as an example of implementation of funding mechanisms. In addition, data about financing animal health systems from Senegal was gathered through a questionnaire to the

relevant authorities. Second, when focusing on community-based systems, a field research in Kenyan arid and semi-arid lands was performed on animal health services.

The gaps in the public health arena likely to influence the increase of zoonotic and emerging diseases occurrence are pointed out throughout the thesis.

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Acronyms

AFFA	Department of Agriculture, Fisheries and Forestry - Australia
AH	Animal Health
AHA	Animal Health Assistant
AHT	Animal Health Technician
AI	Avian Influenza
ATP	Ability To Pay
AU/IBAR	African Union/Interafrican Bureau fro Animal Resources
BSE	Bovine Spongiform Encephalopathy
CAH	Community-based Animal Health
CAHW	Community-based Animal Health Worker
CAPE	Community-base Animal Health and Participatory Epidemiology Unit
CBPP	Contagious Bovine Pleuro-Pneumonia
CHW	Community-based Health Worker
CMW	Community-based Malaria Worker
CRF	Consolidated Revenue Fund
DfID	Department for International Development (UK)
FAO	United Nations - Food and Agriculture Organization
FFS	Fee For Service
FMD	Foot and Mouth Disease
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GHP	Good Hygienic Practices
GoK	Government of Kenya

GoV	Government of Vietnam
HACCP	Hazard Analysis of Critical Control Points
HH	Human Health
IFAD	United Nations - International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
LK	Livestock Keepers group
LRS	Levies Revenue Service
MoA	Ministry of Agriculture
MoE	Ministry of Education
MoF	Ministry of Finance
MoH	Ministry of Health
MoL	Ministry of Livestock
NAHS	National Animal Health Service/System
NGO	Non Governmental Organisation
NHS	National Health Service/System
OIE	"Office International des Epizooties" - World Organisation for Animal Health
PAHC	Primary Animal Health Care
PHC	Primary Health Care
PM	Policy Markers group
PRA	Participatory Rural Appraisal
R&D	Research and Development
RFI	Rural Finance Institutions
RRA	Rural Rapid Appraisal
RVF	Rift Valley Fever

SAP	Structural Adjustment Programmes
SARS	Severe Acute Respiratory Syndrome
UK	United Kingdom
WB	World Bank
WHO	World Health Organisation
WTP	Willingness To Pay

1 Introduction

1.1 Background

The past decade has witnessed a frightening increase of disease epidemics coming from animals and transmitted to humans (i.e. zoonoses). Cases such as Bovine Spongiform Encephalopathy (BSE), Severe Acute Respiratory Syndrome (SARS), Highly Pathogenic Avian Influenza (AI) have been increasingly debated both in the scientific arena as well as, and more importantly, among the population. Risk perceptions of the population about such diseases have heavily pressured governments to react promptly in order to prevent disease spread (The Economist November 10th, 11th and 17th 2005).

As the World Health Organization (WHO) states, "several factors contribute to the emergence and re-emergence of infectious diseases, but most can be linked to the increasing number of people living and moving on earth: rapid and intense international travel; overcrowding in cities with poor sanitation; changes in handling and processing of large quantities of food; and increased exposure of humans to disease vectors and reservoirs in nature. Other factors include a deteriorating public health infrastructure, which is unable to cope with population demands, and the emergence of resistance to antibiotics linked to their increased misuse" (WHO 1997).

Emerging zoonotic diseases have effects at two levels, namely (human) health and the agricultural sector, especially livestock production. Whereas the consequences of the first relate to public health and the associated economic burden for national health systems (NHS), the consequences of the latter refer to the economic burden derived from loss of livestock production at national level from the imposed international trade barriers, animal disease containment etc. The economic burden of such types of diseases is generally difficult to calculate given the spectrum of their consequences. However, an example could be the recent AI outbreak in Vietnam, which for the period January to December 2004 amounted USD 120 million (Riviere-Cinnamond 2005). This figure however, reflects only direct costs on the agricultural side for the Government of Vietnam. Similarly, on a wider scale the economic burden of SARS was evaluated at the beginning of the outbreak. As mentioned by Kickbusch in 2003 "just a few weeks after its [SARS virus] identification - the World Health Organization is calculating that the global cost of the disease is close to USD 30 billion" (Kickbusch 2003).

Linked to the recent occurrence of these disease epidemics and to the aforementioned WHO calculations are the estimates of the International Food Policy Research Institute (IFPRI) on livestock production trends for 2020 (Delgado, Rosegrant, Steinfeld et al. 2000). It is predicted that for developing countries in 2020 there will be an increase in meat and milk production of 40% and 60% (Delgado, Rosegrant, Steinfeld et al. 2000) respectively in relation to the production levels in the 1990s. Consequences deriving from such a production increase will arise at four levels: (i) nutrition, food security and poverty alleviation, (ii) environmental sustainability, (iii) world trade and food prices and, of especial interest for the thesis topic, (iv) public health. These issues will be discussed in more detail in chapter 3.

Public health consequences of what has already been labelled as the "Livestock Revolution" (Delgado, Rosegrant, Steinfeld et al. 1999) derive from the expected increase, not only in animal-human contact, but also to the intensification of livestock production systems. Emerging diseases therefore reflect the "evolutionary response to environmental changes caused by humans" (Gilbert, Wint and Slingenbergh 2004) or human activities. Occurrence of such diseases may be aggravated due to the increase in trade of livestock and derived products not only within developing countries, but also between developing and developed countries. Thus, the diseases mentioned earlier may well fall under the fourth consequence (i.e. public health) derived from this livestock production increase.

It is therefore expected that other zoonotic disease epidemics similar to those recently witnessed will arise in the incoming years. It is also expected that these epidemics will originate in developing countries given that meat production increases are estimated to be four times higher than in developed countries for the same period of time (Delgado, Rosegrant, Steinfeld et al. 2000; Delgado, Rosegrant and Meijer 2001). Preventing emerging zoonotic disease episodes is therefore crucial in order to reduce public health risks and the associated economic burden. Prevention here is thus closely linked to animal disease control and hence, to animal health systems (AHS).

Interestingly, AHS in developing countries (especially in Africa) have undergone important changes over the past three decades. Such changes were often rooted in the lack of public funds to sustain AHS. Therefore, following guidelines from international organisations (namely World Bank (WB) and International Monetary Fund (IMF)), structural adjustment programmes (SAP) were implemented at

national level during the 1980s in order to reduce public spending. Such adjustments also applied to the agricultural sector and, as a consequence, to the animal health sub-sector.

It has already been acknowledged that such SAP did not yield the expected results. Bennell undertook a survey on the privatisation process in Sub-Saharan Africa (SSA) from 1980 to 1995 (Bennell 1997). Data for the study was collected from five main sources, namely:

(i)   Candoy-Sekse database for 1980-1987 and Sader database from 1988-92. These databases were those used by the World Bank in assessing the results of privatization. However, in the first case, the transactions assessed concentrated in only six countries, and in the second database in three;

(ii)   Unpublished data obtained from the World Bank which aimed at updating Sader database until 1995;

(iii)   "Reports and other documentation produced by government commissions, committees and units that have been especially established, often with technical assistance of the World Bank and other donors" (Bennell 1997) in order to put in place the privatisation process. Data was obtained from Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mozambique, Nigeria, Tanzania, Uganda and Zambia;

(iv)   "Information obtained from country desk officer from SSA, and staff from the Private Sector Department at the World Bank" (Bennell 1997); and finally,

(v)   Other publications, which included local as well as international business media. These information types were obtained for 1165 enterprises in 32 African countries.

In Bennell's words: "it is manifestly the case that no SSA country can be singled out as a very successful privatizer in the same way as, for example Chile has been in South America" (Bennell 1997). Furthermore, in countries such as Senegal where privatisation was undertaken early, "the collective performance of SOEs [state owned enterprises] in Senegal deteriorated after privatization" (Bennell 1997). Indeed, even the World Bank acknowledged in the case of Senegal that "there seems to be no major improvement in the financial situation of public enterprises under performance contract"[1] (World-Bank 1996).

Along the same lines, Schatz (1996), with the same data and categories used by the World Bank in the report "Adjustment in Africa: reforms, results and the road ahead" (World-Bank 1994), showed that the structural adjustments promoted in Africa not only did not yield the results outlined in the report, but "implementation of structural adjustment most often causes *poorer* economic performance" (Schatz 1996) (emphasis by the original author). Similarly, Helleiner in his critical paper on the shortcomings of African stabilisation and SAP during the 1980s pointed out that two important aspects were the "relative neglect of the provision of crucial public goods, especially agricultural infrastructure" and the "overestimation of the efficacy of privatization, especially in agricultural marketing and input distribution" (Helleiner 1992).

When focusing specifically on the impact of privatisation in the agricultural sector, thus consequently in the AH sub-sector, Dorward notably has demonstrated that SAP have not led to the expected increase in effectiveness and efficiency (Dorward, Kydd and Poulton 1998). Conversely, it has lately been

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[1] Page 11.

argued that the rationale behind such privatisation process in developing countries may have not been appropriate and that in certain areas of the agricultural sector there is a need to increase public sector intervention.

Privatisation of animal healthcare systems in developing countries, particularly in sub-Saharan Africa, has not yielded the expected results (Dorward, Kydd and Poulton 1998; Leonard 2000). Introduced with inadequate transition time and too few resources, many livestock owners either cannot afford or, just as likely, are unable to gain access to the services they need (Catley, Blakeway and Leyland 2002). Poor livestock owners in remote rural areas suffer the greatest disadvantage. This fact is undisputed but, since privatisation, the primary focus has been on analysing the performance of animal healthcare delivery systems (Ly 2000; Catley and Leyland 2001) and few authors have studied the underlying economic assumptions that have driven privatisation policy nor examined in what ways these assumptions may or may not have been detrimental (Leonard 2000).

To date, the perspective taken in the economic analysis of animal health systems has been derived from Samuelson's goods and services categorisation following the rivalry and excludability principles. Such economic perspective was subsequently adopted as the rationale for privatisation of AH systems under the SAP (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992; Umali-Deininger, Narrod and Deininger 1994; Holden 1999). Taking into account "the profundity of market failure in developing countries" (Schatz 1996), this view failed to address several factors such as failures in the animal healthcare market, especially in rural and remote areas. Analysing the reasons for 'failure' of the privatisation process may prevent future errors in similar situations.

However, lack of resources, especially financial, still remains one of the critical challenges for most developing countries' animal health services. Whether AHS have been privatised or not, animal health or livestock departments (or ministries) are pleading for increased budgets (Evans, Doering, Clarke et al. 2003; Gimeno 2003; Sidibe 2003). It is true however that increasing animal health budgets will not be equivalent to 'increased performance'. However, to date animal health literature is scarce in studies dealing with the different ways in which revenues may be raised to fund AHS (Anteneh 1984). It is especially important in the context mentioned at the beginning of the section, whereby the expected increase in livestock production over the coming years might entail an increase in public health hazards (human and environmental).

In most developing countries, and especially in Sub-Saharan Africa (SSA), the widespread lack of funds also harmed human health service delivery. To counteract such trend, in 1978, during Alma Ata conference (organised by the World Health Organisation - WHO) (WHO 2003), the idea of primary health care (PHC) arose and a common objective was set through the "Health for All" programme. Most countries adhered to this view and hence ministries or departments of health (MoH or DoH) around the world and other stakeholders put effort into attaining this goal. No such initiative can be found in the AH sector. The main difference between the HH and the AH sectors is that during the SAP period, while PHC was implemented in the HH sector, privatisation in the AH sector was already underway.

Nonetheless it is important to highlight at this stage that both systems convey different ideas, given that basic (human) health is seen as a 'human right' whereas animal health, though conveying public health risks, has also economic

(production) connotations. Hence, the perspective of the analysis throughout the thesis focuses on the economic rationale for funding such systems.

1.2 Justification

As seen from the previous section in comparison to the human healthcare sector an exhaustive analysis of AH systems has not yet been undertaken. To date, most of the existing analysis in the AH arena focus on animal health service delivery and do not seem conceptually to include these services as part of a broader system. AH systems start to be seen as an articulated structure and not as separate pieces without linkages as it has previously been (see for example Leonard's first system approach analysis in 2000 (Leonard 2000)). Thus, if AH systems are to be seen as an integral organisation, their structure, components and service delivery mechanisms need to be analysed. Closely related are the funding sources for the activities performed through this system. This analytical viewpoint comes in a period where, as mentioned earlier, emerging disease spread from animal origin is becoming of great concern for national governments as well as for international organisations.

The thesis therefore intends to shed light on the different economic approaches that could have been used during the SAP programmes for the AH sector, based on economic theory. Hence, a relatively new approach in comparison to previous economic analysis of animal health systems is presented in the thesis. This has been propounded recently by a number of economists working in this field (Ahuja, George, McConnel et al. 2000; Leonard 2000). Economic theory, based on the perspective of 'public choice' and the new institutional economics argues that the process of decision-making may be highly significant in influencing efficiency and effectiveness. Traditional 'outcome' analysis omits factors such as self-

interested behaviour and political interference. These may have contributed to higher than expected 'transaction' costs and, therefore, to the failure in many instances of the privatisation process.

The thesis presents three ways in which goods and services may be classified. These patterns are debated following the public choice economics lens. The first relates to the World Bank (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992) and other authors (Holden 1999) categorisation of goods and services following Samuelson's classical perspective of the rivalry and excludability principles (Samuelson 1954).

The second approach follows Musgrave's perspective (Musgrave 1969). It relates to mixed goods/quasi-public goods which bases its classification on the level of externalities. It is argued that this taxonomic method may be a powerful tool for policy-making when according an economic value to the evaluation of externalities. However, difficulties exist in measuring the extent of some externalities.

Finally, the third classification relates to the degree of consumption sharing, especially emphasising Buchanan's 'theory of clubs' (Buchanan 1965). This approach differs from the previous ones in that it does not look individually to each service but focuses on the degree of sharing of services among a defined population. It specifically looks into the relationship existing between the degree of indivisibility and the number of people consuming the good or service. The perspective's utility lies in the optimisation of allocation among groups, hence it complements the previous classification as it focuses more on an implementation level. The theoretical analysis is consequently applied to rural remote areas

following two distinct settings: where no privatisation process has been undertaken and where privatisation has taken place. The analysis highlights that much greater attention than in the past should be paid to issues of governance.

In the future, governments may be expected to act not only as external agents with regulatory power but as part of the nation's animal healthcare system with responsibility for defining overall goals and harmonising and facilitating the market economy. Hence, exploring the available options for decision-makers to raise revenue for AHS is essential. Given the lack of literature in the animal healthcare sector in relation to funding mechanisms for AH systems, the thesis also presents a framework of the options existing in different regional areas to fund these systems. Especial attention is given to the implications of choosing one funding mechanism over another, or more usually the implications of a particular mix-funding source mechanism. The analysis combines theory and empirical evidence, as well as providing examples of current structures (and surrounding debates) of AHS. It aims at bringing together issues related to animal and human health and examines the relationship between funding and resource allocation.

To that aim, two approaches needed to be taken. The first one analysing the functional components of animal health services, and the second one whereby practical approaches to funding mechanisms are analysed, as well as the derived implications for services provision.

The first approach takes a theoretical perspective in the analysis of the functional components of AH systems. Drawing from Musgrave's analytical framework for public finances (Musgrave and Musgrave 1989) as well as on

organisational structure analysis of health systems of Murray and Frenk (2000) and Mossialos, Dixon, Figueras et al. (2002), the analysis concentrates on the different modes of revenue collection, fund pooling and purchasing adapted to the context of animal health services. Other influencing factors in the system's performance - such as the type of integration of collection, pooling and purchasing mechanisms, non-financial resource generation and governance - are also assessed in the context of animal healthcare.

The second approach takes a more practical and descriptive perspective to the available and existing paths down which revenues may be collected. Thus, taxation, national insurance schemes for livestock and/or animal health, private insurance schemes and user charges or out of pocket payments are analysed in the AHS context. Livestock insurance schemes exist in developed countries and also in certain Asian countries. These schemes exist in order to reimburse farmers in case of animal death or ill-health. However, attention should be drawn to the different focus that National Insurance schemes (NI) in the livestock sector may take. These schemes may include compensation funds for losses due to particular diseases and/or animal health services needed to prevent or contain such diseases. Therefore, NI schemes in the livestock sector are conveniently divided into National Livestock Insurance (NLI) and National Animal Health Insurance (NAHI).

Examples illustrating general (e.g. India (Ahuja, George, McConnel et al. 2000)) and earmarked (e.g. Australia (Government-of-Australia 2003)) taxation are put forward through data obtained from the existing literature. Similarly, national (i.e. compulsory) animal health (e.g. Australia's "Animal Health Authority" (Animal-Health-Australia 2003)) and livestock insurance contributions (e.g.

Nepal, Thailand (Mathema and Joshi 2000)) are also discussed, as well as private schemes for animal health and/or livestock insurance (e.g. Israel (Efron 1997)). In the latter, similarities with "health maintenance organisations" (HMOs) are put forward. Finally, the use of charges or out-of-pocket payments for animal healthcare services is also discussed, with especial focus on rural areas.

The latter option links to the chosen service delivery mechanism analysed in the thesis: community-based initiatives. Although many ways exist in which services may be delivered, both in the human and animal health fields, the rationale behind this choice is that most livestock keepers in developing countries live in the farthest places and the settings are characterised by their remoteness and difficulty of access. Community-based initiatives have been, for both human and animal healthcare, a mechanism of reaching these areas. However, as opposed to human health, the AH sector has not been able to describe a common goal or purpose during or even after the privatisation process, and this applies not only to national governments but, more importantly, to the international community. Consequently, there has been an uncoordinated transition without a common vision. Such lack of coordination has led to an important increase in transaction costs, especially in the delivery of AH services in remote and rural areas through community-based programmes.

The relevance of comparing human and animal community-based delivery systems relates to two aspects. First, as mentioned earlier, it is clear that AH systems do not convey the same ethical implications as human health systems. In addition, economic consequences apart, the lack of efficient AHS may incur public health hazards. The clear dichotomy between human and animal health systems in terms of system's structure and funding impedes the proper analysis

of zoonotic and emerging disease spread. Second, and probably more obvious, the comparison relates to their structural organisation and by consequence their governance mechanisms. Using Williamson's viewpoint on institutions of governance, "transaction-cost economics concurs that the transaction is the basic unit of analysis and regards governance as the means by which order is accomplished in a relation in which potential conflict threatens to undo or upset opportunities to realize mutual gains" (Williamson 1998). Hence, as mentioned earlier, given that AH service delivery has to date been seen as a separate arm of the animal health structure, Williamson's viewpoint helps in elucidating critical governance aspects.

Following those lines, Berman pointed out, in relation to the human healthcare sector and the Health for All programme, that in order to expand and integrate community-based programmes into a national structure, there should be an enabling institutional context (Berman, Gwatkin and Burger 1987). This implies not only a common goal and willingness on the part of the involved policy makers, but also, and following Williamson's lines, an enabling contractual context. Given the areas where community-based systems exist, the latter tends to be based on 'trust', which is clearly highlighted in chapter 5 under the case study in Kenyan arid and semi-arid lands.

The thesis therefore aims at analysing community-based animal health initiatives as the delivery branch of a national structure for animal health. The debate surrounding the integration of community-based initiatives into a wider health system (widely debated in the human healthcare literature (Nichter 1986; Chabot and Bremmers 1988; Sauerborn, Nougtara and Diesfeld 1989)) serves as a framework for comparison. CAH initiatives analysed in chapters 4 and 5 follow

the evaluation criteria applied in the human health counterpart. These are (i) efficiency, (ii) equity, (iii) access to services, (iv) quality of care, (v) financial, and (vi) human resources.

The policy and development implications associated with animal health systems are elaborated in chapter 6. This chapter builds on the analysis performed in previous chapters putting AHS within a broader context. Hence, it discussed the rationale behind focusing on AHS by debating their role under a development perspective, as well as under the public health lens. Regarding the latter, issues associated to animal health systems' role and whether and how they could be financed are presented following Pearce's environmental economics lens.

The research questions derived from this section that this thesis aims to tackle are: What was the economic rationale behind the privatisation guidelines released during the 1990s? Are there other perspectives that may be used in such analysis and what are the implications? What are the elements into which AH systems may be divided? What mechanisms may be used to fund AHS and what are their implications? Focusing on AH service delivery through community-based initiatives, what are the criteria needed to assess such delivery systems? What are the key elements needed for these systems to be sustainable?

These issues where first pointed out by the United Nations Food and Agriculture Organization (UN-FAO). To elucidate these issues, the UN-FAO requested the author to undertake a study on AH systems. Topics that were of especial interest to FAO were the economic rationale behind government intervention in AH systems and the existing funding mechanisms and options for the activities that

fall into the public sector domain. Linked to the latter is the delivery AH services.

From 2002 to 2005 the author was based in a Department for International Development (DfID, UK) funded project within FAO's Department for Animal Production and Health (AGA), in the Policy Branch's (AGAL) Pro-Poor Livestock Policy Initiative (PPLPI). In that context, the author was able to participate in FAO official missions during the AI outbreak in Vietnam during 2004 and 2005. Hence, the author was sent as an international consultant to assist the Government of Vietnam in restructuring the public finance component of the AI emergency control strategy.

In addition, from September 2002 to January 2003 the author performed the field data collection with the African Union/International Bureau for Animal Resources (AU/IBAR) in Nairobi at the Community-based Animal health and Participatory Epidemiology Unit (CAPE), also a DfID-funded project[2]. The field collection focused on the sustainability of community-based animal health service delivery was undertaken in Kenya's pastoral areas.

The outcomes of both missions are documented in a join publication of FAO-AU/IBAR in the case of Kenya (Riviere-Cinnamond and Eregae 2003), and in an official FAO internal report in the case of Vietnam (Riviere-Cinnamond 2005). These two documents will therefore be quoted in this thesis.

1.3 Objectives

The overall objectives of the thesis are the following:

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[2] Project in collaboration with FAO PPLPI.

1. To demonstrate the usefulness of applying a new perspective in the economic analysis of animal health systems (chapter 2);

2. To identify the structure and components of animal health systems and the possible mechanisms for financing animal health activities (chapter 3);

3. To elaborate a conceptual framework in which to assess community-based animal health service delivery in rural areas at national level (chapter 4);

4. To assess the "ideal qualities" needed in animal health workers in order for community-based animal health systems in Kenyan pastoral areas to be sustainable (chapter 5).

However, for each of the chapters, detailed objectives are elaborated.

1.4   Methodology and materials

It is important to highlight that the perspectives used in the thesis to analyse animal health systems and their interaction with the public health arena had not been previously used. The viewpoint of the thesis is therefore novel, highlighting the gap existing in the literature regarding the health-agriculture divide.

Thus, characteristic of the thesis is the underlying comparison, in all sections, of animal healthcare systems and human healthcare system. Similarities between the two systems have already been described in earlier papers (Leonard 2000). Leonard stated that "the two professions [human and animal medicine] are close enough that [their] differences help each to look at its own structures and

operations in new and illuminating ways" (Leonard 2000). The theoretical framework used for analysing human healthcare markets is therefore used in this study to illustrate the mechanisms underlying the animal healthcare market.

As previously mentioned, the thesis tackles three main subjects (economic analysis of animal health services, funding mechanisms, and service delivery in remote areas). Each of the sections requires specific methodologies and materials, which are detailed below.

1.4.1   Economic analysis applied to the animal health sector

The way in which economic analysis of animal health services has evolved since the 1990s is described in chapter 2. A comparison is made with economic theories underlying the provision of human healthcare services where the debate started much earlier (in the 1960s). Special emphasis is put on how these perspectives have influenced the privatisation policy. Particularly, the analysis focuses on how the way in which 'public good' is defined affects their financing and provision.

Key references quoted are authors such as Stiglitz and Cullis and Jones. In particular, Stiglitz is quoted in the context of market failure, which is consequently applied in the AH health sector, and Cullis and Jones regarding the classification of goods. Other authors include Meade 1952; Samuelson 1954; Buchanan 1968; Musgrave 1969; Stigler 1971; Coase 1974; Evans 1974; Sandler 1977; Wiseman 1980.

1.4.2   Funding mechanisms for animal health systems

A literature review on the existing mechanisms to fund AHS was needed. Nonetheless, key authors in this section are Musgrave when dealing with the

public finance structure, and Murray and Frenk when analysing the structural components of health services. The literature reviewed relates to three main subjects:

(i)   Public finance economics (e.g. Musgrave 1959; Musgrave 1969; Buchanan 1975; Musgrave and Musgrave 1989; Cullis and Jones 1998; Stiglitz 2000; Stiglitz 2002),

(ii)   Healthcare systems financing (e.g. Propper 1995; Kutzin 1997; Murray and Frenk 2000; Kutzin 2001; Mossialos, Dixon, Figueras et al. 2002; Normand and Busse 2002; Precker, Jakab and Schneider 2002). However, Murray and Frenk's article "A framework for assessing the performance of health systems" (Murray and Frenk 2000) is used as a basis to describe the organisation of animal health systems. The rationale behind the use of this article is that it focuses precisely on the perspective that is lacking in the animal health literature, that is, looking at AHS as a whole system. Additionally, the article is interesting in that it introduces a wider definition of 'health systems', which clearly points out the public health role of animal health systems. Nonetheless, it could be argued that Murray and Frenk's article is too descriptive, but this is compensated by using Musgrave's public finance theory. And, finally,

(iii)   The few examples in the animal health financing literature (Anteneh 1984; FAO 1992; FAO 1997; Mathema and Joshi 2000; Smith 2001; Jabbar, Ehui and von Kaufmann 2002; Evans, Doering, Clarke et al. 2003; Gimeno 2003; Gongora 2003; Government-of-Australia 2003; Sidibe 2003; Van Asseldonk, Meuwissen, Huirne et al. 2003).

1.4.2.1 Methods

However, literature on funding mechanisms for animal health services is very scarce. Therefore, to obtain such data it was necessary to generate a questionnaire. The aim of the questionnaire was to gather details on the current mechanisms and options governments have to fund their animal health services. To that purpose, a close-ended questionnaire was produced (available in <u>annex 1</u>).

Inputs from FAO senior staff members were given during the elaboration of the questionnaire, which was tested (in Guinea, because of FAO contacts at governmental level) and consequently modified. Originally, the questionnaire was supposed to be generated by FAO and distributed to the animal health departments of OIE member countries (Office International des Epizooties - World Organisation for Animal Health, which is the international body dealing with animal health. It is also the standard setting body for sanitary standards in the animal health field under the World Trade Organisation (WTO)). However, due to time constraints and political disagreement between senior management in both organisations it was only possible to perform this questionnaire in Senegal (however, it is expected that when discrepancies between entities are resolved, the questionnaire will be sent to OIE member countries). Senegal was chosen because the regional hub coordinator for West Africa (Dr Sheik Ly) of the Pro-Poor Policy Initiative where the author was working, is based in Senegal. It was therefore easier, through Dr Ly, to hire a local consultant (with adequate knowledge of economic and financial concepts) to perform the questionnaire. To that aim, the consultant (Mr Brice Laifa) was in charge of finding out the different persons concerned with the financial and structural sections the

questionnaire seeks to tackle (given that not all the information was concentrated in one single ministry).

As mentioned in the previous section, one of the aims of the research is to analyse AH systems as a whole entity, from financing to delivery. Therefore, having examined the economic rationale behind government's involvement in AH systems as well as the ways in which these may be financed, the last section of the thesis focuses on service delivery.

1.4.3 Service delivery through community-based initiatives

In order to analyse the community-based service delivery branch of AHS, and following the comparative rationale of the thesis between human and animal health systems, the methodology included:

(i)   A comparative literature review between community-based (human) health workers (CHW) (e.g. Walt 1981; Ofosu 1983; Rifkin 1983; Berman 1984; Nichter 1986; Bender and Pitkin 1987; Chabot and Bremmers 1988; Rifkin, Muller and Bichmann 1988; Walt 1988; Bentley 1989; Walt, Perera and Heggenhougen 1989; Walt, Ross, Gilson et al. 1989) and community-based animal health workers (CAHWs) (e.g. Holden, Ashley and Bazeley 1996; Holden and Chema 1996; Holden 1997; Koma 2000; Woods 2000; Catley and Leyland 2001; Heffernan 2001; Huttner, Leidl, Pfeiffer et al. 2001; Huttner, Leidl, Pfeiffer et al. 2001; Catley and Leyland 2002; Catley, Lynen and Nalitolela 2002; Catley and Mariner 2002; Curran and MacLehose 2002; GI-LSP 2003; Sones and Catley 2003), and

(ii)   A case study (field research data collection) on the selection process and sustainability of CAHWs in pastoralist areas in Kenya. The research was

undertaken as one objective of the Kenyan Veterinary Board is to standardise CAHW selection, training and supervision procedures with a view to ensuring quality at national level. Experience to date indicates that draft policies and guidelines tend to prioritise the views of central policy makers above the perceptions and needs of livestock keepers. For example, in the area of CAHW selection it is widely believed by veterinarians that CAHWs must have received some education and be literate. These views tend to contradict field experience and the relatively high drop out rate of literate as opposed to illiterate workers.

Nonetheless, the economic analysis performed in chapter 2 is used as the analytical tool throughout the service delivery chapter as well as the case study (namely, chapters 4 and 5).

1.4.3.1 Methods

The choice of country for the data collection was based on the interests expressed by the AU/IBAR Community-based Animal Health and Participatory Epidemiology (CAPE) Unit and in collaboration with UN-FAO and local non-governmental organisations (NGOs), namely Intermediate Technology Development Group (ITDG), Wajir South Development Association (WASDA) and Community Initiative Facilitation Assistance (CIFA). Especially relevant to this section is the current situation in East Africa regarding policies in the animal health field. Policy makers in the animal health field in East Africa are currently reviewing policy and legislation on CAHWs. This process is coordinated by veterinary boards but involves various central-level stakeholders such as State Veterinary Services, veterinary associations, veterinary schools and NGOs. CAPE

Unit from AU/IBAR is currently supporting policy and legislative change in the Horn of Africa (HoA) region.

The field research in Kenyan pastoral areas of West Pokot, Wajir and Marsabit (see annex 4) intended to compare the views of policy makers (PM) and livestock keepers (LK) vis-à-vis the qualities regarded as "ideal" for CAHWs. Deriving from these selection procedures of CAHWs, their impact on sustainability of community-based AH systems is also debated. The fieldwork draws from a methodology used in a previous study in the human health community-based service delivery in Guatemala, performed by Ruebush (Ruebush_II, Weller and Klein 1994). This study therefore adds, in the animal health arena, an innovative perspective in the analysis of CAH systems by investigating sustainability issues. Chapter 5 will describe in detail the methods used during the field research as well as for the analysis of the results obtained.

Having seen the methodology and materials needed, next section briefly introduces the way in which the thesis is structured.

1.5   Organisation of the thesis

Following the logic of the previous section, the thesis will be divided into six main chapters. Chapter 1 introduces the background and objectives of the study as well as the methodology and materials needed to obtain these objectives.

Economic analysis of animal healthcare services is introduced in chapter 2. Although this chapter presents the trends in economic analysis of AHS during the past decade, it focuses on the implications of the use of one single perspective.

It therefore proposes and examines the implications of using three different economic perspectives in the taxonomy of goods and services.

The analysis of the existing options to fund AH systems is provided in <u>chapter 3</u>. It therefore presents a theoretical framework to assess funding mechanisms. Several examples of mix-funding sources from the literature are examined. The chapter also includes the data obtained through the questionnaire on financing AHS administered in Senegal.

<u>Chapter 4</u> focuses on service delivery through community-based initiatives. The chapter presents a comparison with the human health counterpart of community health workers. It exposes the different directions, though convergent, the two systems have taken as well as the underlying reasons. Service provision in AH is consequently analysed through a new prism in the animal health literature. Criteria such as equity, efficiency, access, quality of care, financial and human resources are elaborated as main areas to be taken into account when implementing community-based initiatives at a national scale in the AH sector.

Specifically focusing on the human resource criteria presented in <u>chapter 4</u>, <u>chapter 5</u> presents the data collection in Kenya. The field study, which was performed in pastoral areas, namely West Pokot, Wajir and Marsabit, aimed at elucidating the selection process of community-based workers and their role in the sustainability of CAH systems in arid and semi-arid lands (ASAL).

The descriptive analysis performed in chapters 3, 4 and 5 are discussed in <u>chapter 6</u> under the economic lens introduced in chapter 2. Chapter 6 draws on the similarities arising between the thesis topic and Pearce's debate over

environmental economics putting forward the policy implications associated to AH. The last section of chapter 6 pulls together the main conclusions of the research and provides an insight of the areas that would need further research.

2 Economic analysis applied to the animal health sector

2.1 *Introduction*

2.1.1 Background

The first economic analysis of the provision of animal healthcare services (and of livestock services in a broader sense) was undertaken by the World Bank in 1991-1992 (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992). As previously mentioned, its aim was to provide guidance to governments in developing countries, especially in sub-Saharan Africa, on the privatisation of services based on economic principles. In most developing countries however, privatisation has not delivered the desired results (Dorward, Kydd and Poulton 1998). Since privatisation, the primary focus of research into livestock services has been directed towards analysing their performance while only a few authors have revisited the underlying economic theories that had driven the policy of privatisation in the first place (Leonard 1985; Leonard 1993; Ahuja, George, McConnel et al. 2000; Koma 2000; Leonard 2000; Ly 2000).

The perspective taken in the present study differs from most previous ones. Firstly, it takes a retrospective look at the evolution of the application of economic theory to animal health service privatisation, providing alternatives for examining the sector following various economic theorists and their underlying (different) philosophical perspectives [such as Williamson, Buchanan, Peston,

Coase, Cullis and Jones, Stiglitz]. Secondly, the study builds on a comparative analysis using economic theories developed in the human healthcare sector in the 1960s and 1970s, much earlier than their application in the animal health sector, in order to identify reasons for the failure of the process of privatisation of animal healthcare in many developing countries.

The study focuses on the rationale for comparing human and animal healthcare sectors, reviews the different perspectives taken by economic theorists in empirical economic studies and examines the implications of differing perspectives for the analysis of the animal healthcare sector. It aims to provide guidance on the possible role of government in countries where the privatisation of animal healthcare services has been undertaken and attempts to identify the actors and factors that determine how these services function and, in turn, how these actors and factors can be influenced. Further, the study endeavours to draw lessons from past experiences that could be of use for those countries that still have to adopt privatisation policies in their animal health services.

2.1.2 Objectives

The specific objectives of this chapter are:

1. To highlight the evolution of the perspectives taken in the past in relation to the economic analysis of animal health services and their implications;

2. To explore the value of adopting a new approach to the empirical economic analysis of animal healthcare systems;

3. To examine what the role of government should be in the animal healthcare sector;

4. To provide guidance on how to smooth the transition process of privatisation of animal health systems in developing countries.

2.1.3 Organisation of the chapter

The chapter is divided into four sections. Section 2.2 introduces the underlying rationale for the comparison of animal and human healthcare sectors, followed by a definition and description of AHS and related activities. This section also presents the philosophical perspective taken in the study and argues the reasons for market failure in the AH sector. Section 2.3 provides an overview of the taxonomy of goods (and services) following different viewpoints in economic theory and their implications. Section 2.4 focuses on publicly provided private goods and the role of government, with special attention on remote rural areas in pre- and post-privatisation settings. Finally, section 2.5 presents the conclusions and proposes some policy recommendations.

2.2 Economics of animal health systems

2.2.1 Rationale for the comparative analysis of human and animal healthcare sectors

Umali-Deininger, Feder and deHaan (1992) were pioneers in analysing the livestock service (and thus animal healthcare) sector from an economic perspective, as was Leonard (2000) by comparing animal and human health systems. The underlying rationale of Leonard's comparison was based on the similarities existing between the two systems at scientific and

structural/organisational levels. Hence, Leonard's starting point for the comparison lies in that "the biological science that undergirds human and veterinary medicine is the same; in fact a great deal of medical research on which the treatment of humans depends is actually veterinary research, for it is conducted on an array of animals. Although the various species of mammals do have important differences in their responses to disease and treatment, there are significant physiological parallels and many diseases - and cures - pass back and forth across the human / animal divide" (Leonard 2000). Not only did he match the scientific side of the two professions but he also highlighted that "physicians and veterinarians receive similar training, work in professions that are structured much like one another, and oversee analogous hierarchies of paraprofessionals and auxiliaries", and enjoy an information advantage over their clients (Leonard 2000).

However, important differences exist between the two professions. First, the two professions have different histories and thus different conventions and goals. Second, specialisation is not as extensive in veterinary medicine as in human medicine. Third, hospitals play different roles in the two professions in relation to treatment. Fourth, distance is a heavier constraint for receiving or obtaining professional care in the animal health field than in the human health one (Leonard 1993; Leonard 2000). And fifth, different values are attached to human and animal life.

While accepting that there are differences, nevertheless their similarities give sufficient common ground to enable empirical comparisons between the systems. However, before beginning a market analysis of animal healthcare systems it is necessary to define their components and structure.

2.2.2   Defining animal health systems

Several authors (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992; Holden 1999) have attempted defining the boundaries of AHS. Some services, for example clinical services, are always included in such definitions. However, other aspects affecting animal and human health, e.g. extension, public health, are not always systematically taken into account. As an illustration, public health would not only include the classical zoonotic disease control and prevention and meat inspection, but also some aspects generally neglected to date such as hygiene, food processing and conservation, as well as animal waste management. Other aspects related to public health are those linked to research and development such as the use of animals as models for the development of new technologies.

One of the main purposes of AHS evidently is to improve animal health in order to increase animal productivity and hence human nutrition and welfare. There is, however, another aspect of AHS that is usually overlooked: its contribution to the protection of human health. This follows the lines of thought of Murray and Frenk (2000), who define human healthcare systems after the concept of 'health action'. Thus, a health action is defined by "any activities whose primary intent is to improve or maintain [human] health" (Murray and Frenk 2000). Their definition puts forward the conflict arising when dealing with some parts of the animal healthcare sector. Due to the dual nature of public health aspects of AH systems, frameworks for analysing the subject with a systematic and methodical approach (of either economic aspects or funding mechanisms) have not yet been sufficiently developed.

The next sections introduce the different components of the 'broader' definition of AHS that will be followed by a taxonomy of AH services along the perspectives of different economic schools.

2.2.3   The structure of animal health services

Umali-Deininger, Feder and deHaan (1992) divided animal health services (AHS) into three main categories: (i) curative services, (ii) preventive services and regulatory bans and (iii) pharmaceutical supply. In this study, this categorisation is enlarged to include three other components: (iv) public health, (v) education/extension and (vi) research and development. Of course all these elements are closely intertwined.

First, curative services relate mainly to the treatment of diseased animals through diagnosis and the use of drugs. Second, preventive services are meant to stop occurrence of new cases of disease in animals. This is achieved through the use of vaccines, the eradication or control of vectors and/or carriers, and through the application of measures such as segregation. Examples of preventive services include: dipping, quarantine, slaughter of at risk animals, movement restrictions, import and export control of livestock products, inspection and control of animal products, etc. Third, the supply of pharmaceuticals for livestock (for both curative and preventive measures) includes the production of veterinary pharmaceuticals, and the quality control, marketing and distribution of the products. The fourth category, public health, relates to the control of zoonotic and food-borne diseases, hygiene, food and feed safety and environmental aspects, which relate to, for example, water contamination due to mismanagement of animal waste, vector control (e.g. zoonotic vector-borne diseases control such as Sleeping Sickness, Rift Valley Fever, Chagas disease,

etc.). The fifth component encompasses extension in animal health and nutrition and public health education. Finally, the sixth component relates to research and development. Although Umali-Deininger, Feder and deHaan (1992) included this category in preventive services it is important to treat it separately as it concerns not only research in livestock vaccines and disease-resistant or tolerant breeds but also to the elaboration and assessment of new technologies and delivery mechanisms.
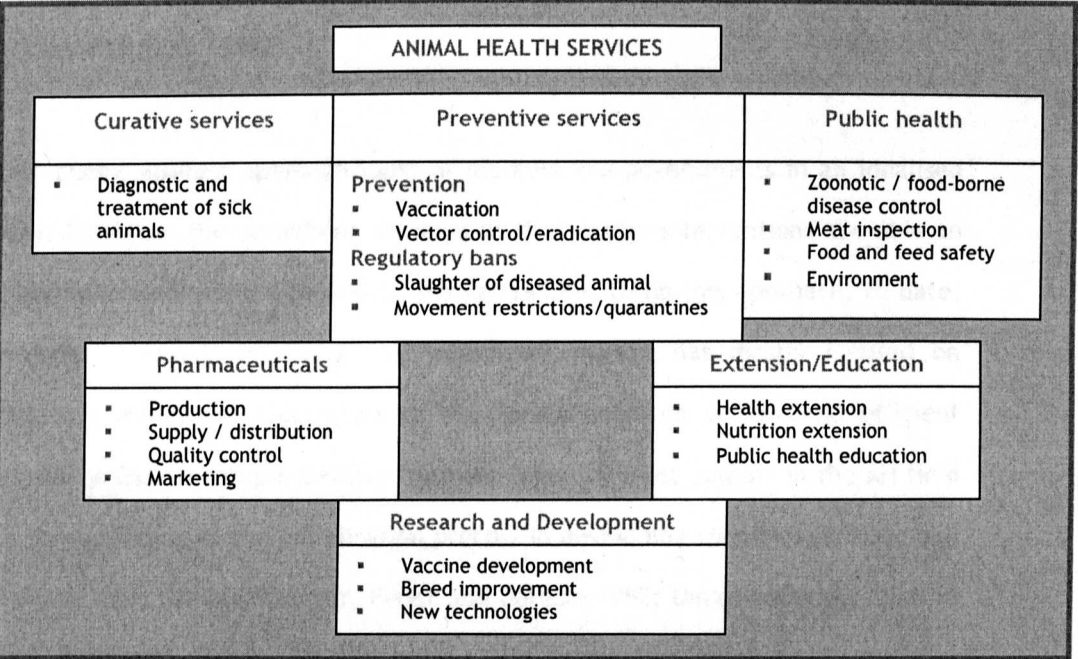
Figure 1: Components of Animal Health Services (adapted from Ahuja 2000)

However, rather than by technical aspects, animal health services can also be classified and defined following economic concepts. Some of these economic viewpoints, which are important for the analysis of animal healthcare systems, are introduced in this chapter.

2.2.4 A public choice approach to the analysis of animal health services

In 1975, Buchanan drew attention to methodological issues regarding the analysis of public expenditure and the nature and structure of collective decisions of what was the traditional public finance approach (Buchanan 1975). Following theories on government behaviour, the government's role can be analysed (i) through the public interest approach or (ii) through the public choice school (Cullis and Jones 1998).

The public interest approach looks at markets and governments in an idealised way, based on the underlying assumption that public interventions are able to eliminate inefficiencies caused by market failure. Using this approach, to date, economic analysis in the animal healthcare market has mostly focused on outcome efficiency. This refers to the Pareto optimum or top-level efficient economy. This is the perspective that was taken by most authors in the AH field at the beginning of the privatisation process in developing countries (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992; Umali-Deininger, Narrod and Deininger 1994). Briefly, what this perspective emphasizes are the requirements that allocation of resources should reflect individual preferences, ensuring that each good or service is priced at its marginal cost, relative to other services these resources might have produced. This traditional 'outcome' approach, exemplified in the economic literature by Musgrave (1959, 1969) and Musgrave and Musgrave (1989), is normative in its orientation as it attempts to determine how 'economically correct' decisions can be established for the public sector (Cullis and Jones 1998).

The public interest perspective was taken by the above-mentioned authors with the aim of advising governments in developing countries, especially in sub-Saharan Africa in view of the fiscal collapse of most of the states, also known as the 'Great African Depression' during the 1980s and 1990s (Leonard 2000), on which components should be privatised in the animal healthcare sector. This approach was new in the early 1990s and economic theory backed up the reasoning. But it should be noted that, to date, as pointed out in section 1.1, the privatisation process (in most countries) did not yield the expected positive outcomes (Helleiner 1992; Schatz 1996; Bennell 1997). The same holds true for the privatisation of AHS (Dorward, Kydd and Poulton 1998). Hence, there is a need to consider other economic theories that could be applied to the analysis of AHS, to assess the main differences between the previous and other economic theories, and to identify possible reasons for the failure of the privatisation process while giving feasible alternatives to redress the current situation.

The perspective taken in this paper for the analysis of AHS is that of public choice theorists, who consider that public interventions and interests can add inefficiencies to the existing regulation. They believe that governments are not free in their choices but depend on powerful interest groups. Hence, given the context and political interests behind national agricultural agendas in most developing (as well as developed) countries, policy-makers' choices and behaviours cannot be separated from the interests affected by the decisions taken. Similarly, an economic perspective first used by Wiseman in the 1960s (Wiseman 1960; Wiseman 1980), referred to as process efficiency, recognises the weakness of the principle of marginal equivalence in detracting attention from the equally important efficiency in allocative techniques, which refers to how access to animal healthcare services will be rationed or priorities set to attribute

resources efficiently. Thus, the perspective has changed from viewing the government as 'outside' of the analysis and largely 'unproblematic' (interested in outcome efficiency) to a point of view that includes non-market determined decision-making. Wiseman's viewpoint emphasises that attention should be drawn towards the procedures of decision-making and not exclusively to the outcomes. The underlying challenge is to determine whether an alternative decision-making process could have produced a 'closer to optimal' outcome. In relation to the AH field, this is the most recent perspective taken and mostly relates to authors like Leonard, Koma and Ahuja. This perspective is new in the AHS in that previous authors did not consider decision-making processes might hinder reaching optimal outcomes.

Along the lines of public choice theory, Stigler (1971) first discussed the idea that regulation is the result of special interests that provide financial and political support in return for favoured legislation (Stigler 1971). Hence, there is a demand for political favours arising from special interest groups. An example of this situation is given by the current reluctance of some members of the Kenyan Veterinary Board (KVB) in legalising the status of community-based animal health workers (CAHWs). Laffont and Tirole (1993) have tried to extend the public choice perspective to reflect the regulatory environment and capture the nature of the constraints that prevent the regulator from implementing the preferred policy (Laffont and Tirole 1993). Three key constraints were highlighted: (i) information gaps, referring to whether the regulator has sufficient information or if it has to be obtained, and how costly this process may be; (ii) transaction costs, given that in the presence of a regulatory contract the cost of writing this contract as well as the surrounding contingencies should be taken into account; and (iii) administrative and political constraints. Relating to the agricultural and

public health context is the example highlighted by Propper where she raised the issue of regulatory capture in the context of the British National Health System (NHS) (Propper 1995). However, the concept of regulatory capture started in the 1960s (Stigler and Fiedland 1962). This refers to a regulating agency, which has close association with the regulated and thus may be more sympathetic towards the latter than to other stakeholders. The regulatee 'captures' or takes control of the regulator and sets the regulatory process to work on their behalf. The handling of the BSE crisis in the UK provides an important policy example of the regulatory capture situation. The UK's Ministry of Agriculture, Fisheries and Food (MAFF)[3] was 'captured' by powerful industrial interest groups, thus failing in its way of dealing with the crisis.

In summary, the *outcome* or 'traditional approach' refers to normative or welfare economics, which attempts to evaluate or judge alternative policies, weighing up the various benefits and costs. The outcome approach thus shows how 'economically correct' decisions can be reached in the public sector. The *process-oriented* or public choice school, although implying normative analysis, takes a more positive economics perspective – that is using and constructing models that describe and predict either how the economy will change or the effects of different policies - as it takes into consideration the self-interested behaviour of the different actors in the public sector context. What these two schools have in common is the fact that they are based in the so-called 'methodological individualism'. Individuals are thus the units of analysis and best judges of their welfare, individual valuations of arrangements are what matter.

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[3] Now called DEFRA (Department of Environment, Food and Rural Affairs).

Given the highly politicised environment surrounding the agricultural sector, a move from a traditional economic analysis of the animal healthcare market towards a public choice school analysis is recommended. The reasons for market failure in the animal healthcare sector should also be analysed using the same 'public choice' perspective.

2.2.5   Market failure in the animal healthcare field

Following Stiglitz (2000), there are six conditions under which markets are not Pareto-efficient. These conditions are referred to as market failures and provide a rationale for government activity. These are (i) failure of competition, (ii) existence of public goods, (iii) presence of externalities, (iv) presence of incomplete markets, (v) information asymmetries or failures and (vi) macroeconomic distortions (Stiglitz 2000). This section focuses on the conditions existing in the animal healthcare market. The presence of failures and rationale for government intervention are consequently discussed.

For markets to result in Pareto efficiency there must be *perfect competition.* This means there must be a sufficiently large number of 'firms or producers' so that they consider they have no effect on prices. Taking into account that the 'producer' in the AH sector refers to animal health related workers (i.e. veterinarians, animal health assistants (AHAs), community animal health workers (CAHWs), etc.) it is possible to highlight at least two settings that are likely to differ in terms of competition. The first one is the urban setting where, as in the human health field, theoretically there is more availability of private primary healthcare facilities and the consumer is able to choose between what the market offers. Hence, prices are supposed to be 'adjusted' by competition between service providers. Evidently, at this stage information asymmetries arise

so that this competition is not perfect. But this is another market failure that will be analysed later in this section. The second setting refers to remote rural or pastoral areas. In these areas, there are not enough private suppliers of health services (either for animal heath or human health) for market competition to lead to Pareto-efficiency.

For the prices of AH services to be determined by competitive pressure in either of the two settings there is a need for sufficient availability of veterinarians and animal health assistants. Because veterinarians and animal health related professionals usually require licenses in order to practice, licensing patterns are likely to have an effect on competition. If they are able to control the granting of licences to prospective colleagues, veterinarians may therefore have a certain degree of power over market forces. Hence, they may be in a position where they can restrict the competitive forces that should help minimising animal healthcare costs.

If entry to the profession is restricted (*barriers to entry*) the amount of healthcare provided will be less than what would be expected by market forces as there will be fewer veterinarians. As there is a limited supply, prices of veterinary services will be higher than what they would have otherwise been. Yet, it has often been argued that licensing is required to maintain standards given that the imbalance of information between consumer and provider arises also at that level. This however leads to the recurrent problem in most remote rural settings of unlicensed providers of services and advice. Even if standards are set to deliver quality animal healthcare services, the lack of staff in remote rural areas, combined with the existing demand from livestock keepers for AH services, has led to the emergence of black markets and illegal drug sellers.

Depending on the country, the fact that there is no staff in those areas is not because of lack of licensed veterinarians but to the fact that they are not willing to work in remote rural areas due to the lack of infrastructure and amenities and often presence of insecurity. This is the case for example of Kenya.

Nevertheless, delivering veterinary services exclusively through a private market would also incur failures, as there are *public goods* that either will not be supplied by the market or, if supplied, would be supplied in insufficient amounts. Although the existence of *'pure' public goods* has been widely debated in the economic literature and will be further elaborated in relation to the AH field in section 2.3, it is possible to acknowledge the presence of goods of low-rivalry and low-excludability in the AHS. Also, following Stiglitz (2000), public goods can be seen as an extreme form of *externality*. Or, stated in another way, externalities might be seen as a form of impure public goods. Several examples can be found in the AH sector which highlight the presence of externalities arising from farmers' or producers' actions and some are given in section 2.3. Therefore another market failure applies to the animal healthcare market, as economic theory predicts that resource allocation driven by pure market forces under the presence of externalities will not lead to optimal efficiency.

Public goods and services are not the only goods and services that private markets do not provide adequately. Whenever private markets fail to provide a good or service, even if the cost of providing it is less than what individuals are willing to pay, there is a market failure referred to as *incomplete markets*. In a perfect market, "consumers know exactly what they want, when they want it and where they can get it" (Stiglitz 2000). In the healthcare setting this would only be possible if the 'consumer' could foresee what will happen in the future.

There are situations in animal healthcare that can be planned in advance as, for example, the avoidance of production losses due to worm infections through regular deworming. However, there are many items of animal healthcare consumption that cannot be planned in such way, as animal disease may strike suddenly and/or unexpectedly. In addition, the health care required to overcome such problems might be expensive or even unaffordable (either as single payment or, if the condition persists over a period of time, through accumulation of costs). These situations are at the origin of health insurance markets (see sections 3.4.3 and 3.4.4). Thus, insurance markets, whether state owned or privately run, help counteracting the financial burden of uncertain consequences of animal ill-health.

Two types of incomplete markets can arise: insurance markets and complementary markets. The question why *insurance markets* are imperfect has been extensively researched in the past two decades (Stiglitz 2000) and three answers have been put forward: (i) deterrents to innovation; (ii) transaction costs; and (iii) asymmetries of information and enforcement costs.

Innovation refers not only to the creation of new technologies, diagnostic methods and drugs, but also to the design of new (animal health or livestock) insurance policies. When no patent protection system exists for such policy innovations there is a disincentive to innovation. As a result, it is expected that there will be under-investment in the development of insurance mechanisms (Stiglitz 2000). As pointed out by Williamson (1996), and following Arrow's earlier debates in relation to property rights and information, "if investment in innovation cannot lawfully be protected or if nominal protection (e.g. patent) is ineffective, then (i) the *ex-ante* incentives to make such investments are

impaired and (ii) the incentives to embed such investments in protective *ex-post* governance structures are increased" (Williamson 1996).

The lack of introduction of many 'insurance products' is related to *transaction costs*. Williamson pioneered in the analysis of markets by using the 'transaction cost' approach (e.g. Williamson 1979). Analysing market from a transaction cost perspective pinpoints the difficulties in which markets run in the presence of the following three conditions: (i) asset specificity with respect to user/s, (ii) bounded rationality of individuals (i.e. individuals exhibit limited computational and information processing capacities), and (iii) opportunistic self-seeking behaviour. In situations where all three apply, contracts cannot successfully deal with the situation (Cullis and Jones 1998). The underlying principle introduced by Williamson into economics is the organisation of transaction costs to minimise effects of individuals' bounded rationality whilst safeguarding them from opportunism. Individuals' bounded rationality refers to the limited computational and information processing capacities of individuals (Cullis and Jones 1998). Along these same lines, Dugger highlights the role of the state as a transaction cost minimiser (Dugger 1993). However, he regards the state differently than the traditional public finance school. He sees the state as an agent that "defines property rights, resolves disputes and monitors performance" (Cullis and Jones 1998). When engaging in the AH market, an insurance firm (for example a cooperative delivering AHS to several farmers, livestock insurance, etc.) might be reluctant to invest in the design of an (new) insurance policy if it is unsure whether anyone will buy the policy.

Large organisations have the possibility of reducing the costs per unit produced as they can distribute the fixed costs across their products leading to economies

of scale. An example might be marketing as independently of how many people are insured, marketing costs remain the same. Thus the more people insured the less expensive are marketing costs per consumer. This also applies for administrative tasks as processing bills and collecting premiums. In markets where there are numerous competing insurance companies, economies of scale are unlikely to arise as each company has its own administrative and marketing costs. The administrative and marketing costs per individual might be higher than when these costs are shared within a bigger population size. A larger administration could spread the administrative costs over more consumers and thus costs per consumer would be reduced. However the problem of an insurer monopoly, which could be exploitative, may arise. A public monopoly would be an alternative as low costs could be maintained without the risk of exploitation. This 'friction' or transaction cost could also be reduced if premium collection was 'piggy-backed' on to the tax collection system.

Neoclassical economic theories consider *transaction costs* to be very small (or zero). This is why market mechanisms are often considered a better option than any government intervention. To decide whether a good or service should be provided publicly, there is a "need to compare the savings in transaction costs plus the gain from increasing consumption, with the loss from excessive consumption of the good plus the loss from distortions created by the taxes required to finance the provision of the good or service" (Stiglitz 2000). However, as mentioned above, Williamson shows that transaction costs are likely to arise in the real market economy (Williamson 1979).

Transactions costs arise generally because information is imperfect (Cullis and Jones 1998). According to Cullis and Jones (1998) they can be classified into (i)

"search costs", which are associated to establishing "the distribution and location of offers to trade"; (ii) "bargaining and negotiating costs", which refer to the costs coupled with "establishing what the terms of mutually beneficial agreement to trade will be"; and (iii) "contract costs", which are those related to enforcing and monitoring the conditions of trade.

In the animal health sector, as in many others, middlemen exist (formally or informally) to reduce these transaction costs as they deal with information. However, when middlemen exist informally, there is no monitoring system, which may give rise to undesirable behaviour such as moral hazard and opportunism. This holds especially true in the case of rural remote areas, where information asymmetries are bigger. Hence, as in the case that will be explored in chapter 5 regarding community-based workers, community members rely on "trust" on the candidate during the selection process. Similarly, during the recent AI outbreak in Vietnam (in 2004-2005), given that middlemen are used as links between small poultry producers and the market, and that they work informally, it was difficult to monitor animal movements (farmers were also moving their own animals) (Riviere-Cinnamond 2005). Consequences of such behaviour give rise to, not only transaction costs given that the farmer tends to receive a much lower amount than the true market value of the animal, but also, and most importantly in this case, to public health hazards because the opportunistic behaviour of the informal middlemen increases the probability of AI spread (as they are difficult to monitor).

The third set of reasons for imperfections in insurance markets relates to *asymmetries of information and enforcement costs*. An insurance company or cooperative that provides animal health services is normally less aware of the

animal health risks than the farmer enrolling. Hence, adverse selection is likely to arise. Adverse selection is a consequence for insurance markets arising from information asymmetry. Insurance companies may have no idea of the risk status of particular animals or herds and a premium reflecting the general animal health risk would be collected. Risk can be calculated in relation to different variables. These can be the number of animals, type of breeds, disease status in the zone where the farmer is settled, and probability of disease occurrence etc. The premium paid by all those who take out insurance would be the same. This is called 'community-rating' and reflects the 'average risk' level of the insured livestock population. For those livestock keepers who perceive that their animals are at low disease risk, this premium might seem too high.

Therefore they will choose not to insure their livestock. The consequence will be that the average risk of the insured livestock population will rise due to low risk herders not insuring. As the average risk will now be higher, the premium will need to rise and other farmers will opt out of the insurance scheme. This process, whereby the lowest risks drop out of the insured group is called adverse selection. In a competitive market the response of insurance companies will be to tailor their insurance premiums to the risks of various groups of herders (for example in relation to the number, age, and breed of animals as well as bio-security measures adopted), rather than leaving a low risk group of non-insured farmers. This method of premium setting is called 'experience rating'. As a result of this process, higher risk groups might have to pay higher insurance premiums to maintain coverage, which they might not be able to afford. It is important to point out that the higher risk groups could be poor and uneducated (in animal health) smallholders, but could also include those who are not necessarily poor, but start raising livestock without animal health knowledge. This process,

whereby low risk individuals are drawn into low-premium plans is referred in the literature as 'cream-skimming' or 'cherry picking' (Donaldson and Gerard 1993; Mossialos, Dixon, Figueras et al. 2002).

Furthermore, in the animal health sector there are also problems associated with the absence of *complementary* markets. This is of most relevance in developing countries where large-scale coordination is required in order to develop certain types of programmes (Stiglitz 2000). The integration of the sparse initiatives that deliver animal health in rural and peri-urban areas (NGO programmes, private initiatives, etc.) into a wider national animal health system will need some degree of government coordination. Therefore one of the objectives of government development agencies is to provide that coordination (governance in the context of community-based initiatives will be discussed in section 4.4.3). However, governments too face transaction costs, enforcement problems and asymmetries of information although in many instances they differ from those in the private sector. As pointed out by Leonard (1993, 2000), a number of countries have suffered a significant increase in transaction costs within the state activities since their independence. These come, for example, from corruption, patronage and inflated public payrolls. Incentives in these conditions tend to be perverse, negative or weak, leading to opportunisms and low levels of public sector performance (Leonard 1993; Leonard 2000).

It has been shown that in incomplete animal healthcare markets there are *information failures*. Assuming perfect knowledge in a healthcare market means that the consumer (herder) is aware of the health status of his animals and knows all the options available to contribute to the improvement of their health. It is also assumed that the herder knows how much each of these options can

contribute to enhance their animals' health and is able to evaluate the relative quality of each of these options. From a market economic perspective, customers of both human and animal health services have less knowledge and information on the available treatment/preventive options than the physicians or veterinarians respectively (Leonard 1993; Leonard 2000). Buyers and sellers have unequal information, which is easily explained by the fact that physicians and veterinarians have invested considerably in their education and training. For minor common ailments and chronic diseases, herders may be aware not only of the condition of their animals but also of the treatment options available (e.g. mastitis). However, this is less likely to be the case for acute, severe and rare conditions, while sub-clinical disease would go unnoticed. Accumulation of knowledge by livestock keepers is determined by the regularity in which they use the market. Some elements of knowledge are thus obtained by accumulation of 'learning from mistakes'.

Given the technological relationship between veterinary services and animal health, and taking into account that the health market is not regularly visited, herders will often not be in a position to judge what the consequences of certain diseases would be in the absence of a veterinary service. In these cases the advice of a qualified and knowledgeable 'expert', who is familiar with the 'market', i.e. a veterinarian, is required. The need for an expert is further enhanced by the nature of the decision faced by the consumer. Depending on the commodity, taking the wrong decision might only have minor consequences. However, in the animal healthcare market errors in decision-making can lead to serious consequences, which might go well beyond what an individual might afford. A farmer might for example lose his entire herd, a country might lose an export market or a zoonotic disease could seriously affect consumers. The

information asymmetry between practitioner and herder leads to an agency relationship between the provider and the recipient of animal health services (this is expanded in section 3.2). Such relationship links with Arrow's agency theory (Arrow 1985) highlighting the possibility that moral hazard arises. Following the assumption of perfect knowledge consumers (herders) would act freely in their own interest when deciding what to consume/purchase and what not to consume/purchase. Under the same conditions, suppliers (veterinarians) would also act in their own interest when providing commodities most highly valued by consumers relative to their prices. But taking into account the lack of perfect knowledge in the health care market on the part of the herders or stock owners, veterinarians are often placed in the position of providing expert advice to herders about care to be provided by themselves or their colleagues. Thus the supplier of care is able to influence substantially the demand for that care.

In insurance-based healthcare systems there is the possibility of 'excess demand' not only from the consumer's side but also from the provider's side (Evans 1974). *Consumer's moral hazard* arises in two scenarios and will depend on what the stockowner is insured against. First, the fact of being insured reduces the financial burden of having diseased animals. Thus, these situations become less undesirable and incentives to apply preventive measures are diminished resulting in increased probabilities of requiring AH care. Second, should disease appear, the insured herder does not have to pay (or a small part) for AH services at the point of use, which encourages him/her to use more than s/he would otherwise have done.

Provider's moral hazard can result from a lack of awareness of costs (for example, lack of awareness of the price of the drugs prescribed), or from the use

of fee-for-service (FFS) remuneration for veterinarians or other AH professional .

in which fees depart from 'market' prices (see section 4.4.2.1). In systems using

FFS as a remuneration method, AH professionals are paid a fee for each item of

service provided to herders. Conventional wisdom in such systems says that AH

professionals have an incentive to provide care in excess of what would be if

consumers were fully informed. This phenomenon is also known in the literature

as 'supplier-induced demand' (Evans 1974). If the fee is greater than the true

competitive price, then there will be an incentive for over-providing. Conversely,

if the fee is lower than its true competitive price, there will be an incentive to

under-provide.

Because of the asymmetry of information, consumers are not able to moderate

this behaviour and when using a third party payer or insurer, consumers do not

even have an incentive to temper such behaviour. It is therefore important to

counteract moral hazard. This is normally done through financial incentives or

disincentives as for example a capitation form of payment. Capitation is often

used in the human healthcare sector as a method of payment in primary care

(this applies to the private - e.g. health maintenance organisations (HMOs) - as

well as public context). "Doctors receive an annual payment in advance to care

for each individual who elects to join their lists. The main advantage claimed for

this method is that it motivates doctors in the primary care sector to practice in

a way that encourages patients to join their lists although it could be in the

doctor's advantage to attract only low-cost people" (Donaldson and Gerard

1993). Calculating the capitation fee may differ from a single flat rate for all

patients to a risk related calculation fee. However, these mechanisms will

depend on the financing structure of the healthcare system in each country,

which in turn is related to what consumers (herders) want from the providers

(veterinarians or AH professionals). There is an added agency problem given that agents (service provider) and principals' (consumer or third party payer) utility curves differ. The agent may well be able to indulge in many complex moral hazards as well as over-supply. This agency problem may be acute in remote rural or pastoral areas, where unsupervised AH workers are left to undertake tasks that few can monitor, hence giving rise eventually to opportunism.

Finally, the last failure that can arise in the animal healthcare market relates to *macroeconomic distortions*. AH systems in many developing countries are highly dependent on foreign aid coming from different countries' donors and/or development agencies. Recommendations from international agencies on how funds should be allocated also relate to the overt and hidden agendas of donors, which may positively or negatively affect the animal health sector.

2.3   Defining public goods

Economic theory and principles have been largely used for the analysis of different types of markets. The neoclassical economic theory applied to the human healthcare field developed rapidly in the 1960s and 1970s. In the animal health sector, however, the debate about the provision of animal health services only started roughly a decade ago (Umali-Deininger, Feder and deHaan 1992), although one might argue that Leonard started talking about user fees for the AHS in 1985 (Leonard 1985). The fundamental reason for this debate related to, as mentioned in section 1.1, the widespread lack of funds in various countries in the developing world at that time. Given the context of lack of public or government funds, animal healthcare services were classified following the 'outcome' approach rationale and governments were advised to privatise all

animal health services which fell in the category of delivering 'private goods' and only to finance those providing 'public goods'.

Given the meagre success of the privatisation process in many developing countries (Schatz 1996; Bennell 1997; Dorward, Kydd and Poulton 1998), it is possible that the analysis failed to take into account some important and decisive factors. As mentioned earlier, this classification of goods or services did not consider some influencing factors such as the political and institutional context nor physical constraints. It is therefore relevant to re-examine the taxonomy of goods applied in the analysis of AH systems under the outcome approach and highlight the pitfalls and consequences that might have derived from its application.

2.3.1 The taxonomy of public and private goods

Rather than elaborating on the distinction between private and public goods, this section focuses on the degree of 'publicness' of goods because this determines whether such goods or services should be financed and/or provided by the market or by governments (Cullis and Jones 1998). However, in order to assess how 'public' goods and services are, they need to be examined and only then can the appropriateness of provision and finance be determined.

Public goods were categorised by Samuelson (1954) along the lines of the principles of rivalry (i.e. two persons cannot enjoy a specific benefit at the same time) and excludability (i.e. access is denied to persons who have not paid for this product or service). This categorisation has been widely debated in the economic literature. Samuelson's definition of public goods began a debate in which several leading economists argued the difficulty in finding public goods in

the purest sense. Examples such as law and order and defence, typically assumed to be public goods in the purest sense, were criticised by authors like Margolis (1955) and Sandler (1977). They argued that even these examples did not fully comply with Samuelson's definition. For example, "in the provision of law and order (or medical care), the use of individual A of law courts (or hospitals) subtracts from consumption by individual B if they must now wait" (Cullis and Jones 1998). Defence, generally associated with protection, may not either completely satisfy the 'pure' public good definition. For example, a situation in which armies are employed in the north, "will this not detract from protection for communities in the south?" (Cullis and Jones 1998). The same applies to the classical example of lighthouses, which was counteracted by Coase for the same reasons (Coase 1974). In the environmental economics literature, Pearce states that a good with low rivalry and excludability is the ozone layer depletion (Pearce 1995). Indeed "no one would benefit from its degradation as it is associated with increased skin cancer incidence" (Pearce 1997). Hence the debate should not focus on the two extremes, namely *pure* private goods and *pure* public goods, but on the myriad of *impure* public goods existing between the extremes.

The reasons associated to the role of government in providing private goods may also draw similarities with the parent-child model. Education systems and immunisation programmes may be seen as an example. In this case several recent events in countries such as the UK show that the most educated layers of the British society do not wish to immunise their children because they are afraid of the secondary effects of the vaccine. However, they enjoy of the positive externalities of the publicly provided vaccination programmes targeting the lower levels of the society where children vaccination is performed and where

parents tend to be less aware of the possible secondary effects of vaccination. In this case, education affects the behaviour of the society.

Three ways have been argued in which good can be classified (Cullis and Jones 1998). The first derives from Head (1962) and Peston (1972) and focuses on the characteristics of the good, i.e. the classical approach to excludability and rivalry in consumption. The second, supported by authors such as Musgrave (1969) and, in a similar way, Weisbrod (1988), is based on the assessment of the mix of services/benefits that stem from the provision of the good, also referred to as 'mixed goods or quasi-public goods'. Finally the third, supported by Buchanan (1965), relates to the different levels of consumption sharing. This refers to the relationship existing between the degree of indivisibility and the number of people consuming the good.

In the animal healthcare sector only one type of analysis has been performed to date and this relates to the first categorisation (Umali-Deininger, Feder and deHaan 1992; Holden 1999). This approach is re-examined below and two new ways of approaching AH services classification are proposed.

2.3.1.1   Excludability and rivalry

One approach to the taxonomy of goods is to focus on their characteristics with respect to excludability and rivalry. Following Head and Peston's classification, four categories can be obtained (table 1). Category D, goods that are non-rival and non-excludable in consumption, are *pure public goods*. At the other extreme, category A, lie the *pure private goods*, which are both excludable and rival in consumption. Category B refers to sharing of common resources, known

as *common pool goods*, where no one can be denied access but the service profits exclusively the user and detracts from the possible use by others (for further detail, refer to Meade (1952) for the classical example of bees from hives of different beekeepers and the collection of nectar from a nearby orchard of apples). Finally, excludable but non-rival goods are also referred to as *toll goods* (C) because a payment limits the number of users asking of the service, but once paid, each individual admitted may consume services without subtracting from the benefit to others (within capacity limits).

	Excludable	Non-excludable
Rival	A	B
Non-rival	C	D

Table 1: Taxonomy of goods (adapted from Cullis and Jones 1998)

Several authors have used these terms in order to classify goods and services provided by animal health systems (Umali-Deininger, Feder and deHaan 1992; Umali-Deininger, Narrod and Deininger 1994; Holden, Ashley and Bazeley 1996). However, the most extensive interpretation of this technique was elaborated by Holden (Holden 1999). Given the previously mentioned controversy regarding the existence of *pure public goods* following the two principles, Holden's categorisation followed the criteria of 'low' and 'high' rivalry and excludability. She then associated the categorised goods to what empirically is supposed to be the adequate funding mechanism. The results of her assessment are presented in table 2. The list of goods and services included in the example is not exhaustive and does not include some of the major components of AHS (refer to figure 1 in page 70). The classification of some of the examples is also debatable, as well as their associated source of financing.

In relation to goods included in category A, given their characteristics - high rivalry and high excludability - theoretically there is a strong incentive for the private buyer or consumer to pay for the good or service. Examples of these, mentioned by Holden, include clinical services, use of vaccines and veterinary pharmaceuticals and prevention and control of endemic diseases. However, one might argue that even items in category A (particularly item *(a)*) may have positive spillovers to other herders, for example under common grazing. However, Holden mentions that "private benefits of vaccination against endemic diseases usually outweigh the benefit to others" (Holden 1999), which is true, but holds equally true for vaccination against epidemic diseases.

Some debate may also surround the association of clinical services *(e)*, and vaccine and drug sales *(b)* to private financing (i.e. by the end user). One of the underlying reasons behind private goods delivery is the need for enough aggregated demand for these services or goods to be delivered through adequate market competition. This implies the existence of multiple service providers and users. Therefore, depending on the context, either physical or institutional, such aggregated demand might not be sufficient to leave these goods or services to end users' private funding. An example of such situation are remote pastoral areas where subsistence farming is common. The ability to pay for such services or goods might be too low and the aggregated demand for the services would not be sufficiently high to stimulate provision through market competition. Ability to pay (ATP) is here separated from willingness to pay (WTP) given that several studies (as for example Ahuja, George, McConnel et al. 2000) have demonstrated that poor livestock keepers are willing to pay for clinical services but are not always able to pay for such services given their low economic situation. Thus, the

goods or services, despite having characteristics of private goods, might not be adequately delivered without a certain degree of public (co-)funding.

Along these lines but in the HH setting, Philipson investigates "the degree to which the occurrence of vaccine preventable disease affects vaccination efforts against such diseases" (Philipson 1996). Indeed Geoffard and Philipson (1997) conclude that, both price reductions and mandatory vaccinations are "limited in their ability to achieve eradication because the increased demand of individuals covered by the program lowers the incentive to vaccinate for those *outside* the program, due to any reduced prevalence brought about by a program" (Geoffard and Philipson 1997). Geoffard and Philipson (1997) argue that the Pigouvian justification for subsidising vaccinations (given their positive externalities) may not solve underprovision. The reason is that price elasticity of demand lowers with increased disease occurrence, "to the extreme of being inelastic to subsidies" (Geoffard and Philipson 1997). However, they mention that there is scope and potential profitability for a monopolist to eradicate the disease, even when it is know that the eradication of the disease will lead to the eradication of the monopolist's product. Such reasoning can also be applied to the AH setting and would explain why several disease eradication programmes have not reached the desired goals (e.g. FMD, CBPP, ECF etc vaccination campaigns).

		EXCLUDABILITY	
		HIGH	**LOW**
RIVALRY	**HIGH**	**PRIVATE GOODS** ■ Endemic disease control and prevention *(a)* ■ Sales of drugs and vaccines *(b)* ■ Some extension *(c)* ■ Some research *(d)* ■ Clinical services *(e)* *PRIVATE FINANCE* *A*	**COMMON POOL GOODS** ■ Tsetse control on communal land using traps, targets or aerial spraying *(j)* *PUBLIC FUNDING* *B*
	LOW	**TOLL GOODS** ■ Vaccine production *(f)* ■ Diagnostic services *(g)* ■ Veterinary clinics (h) ■ Dips *(i)* *PRIVATE FINANCE* *C*	**PUBLIC GOODS** ■ Epidemic or zoonotic disease control (surveillance, movement control, quarantine services) *(k)* ■ Some extension ■ Some research ■ Control of food borne diseases *(l)* *PUBLIC FINANCE* *D*

Table 2: Classification of goods following the rivalry and excludability principles (adapted from Holden 1999)

Given the characteristics of *toll goods*, economic theory suggests these should mainly be financed or paid for by end users. Examples mentioned by Holden include vaccine production units *(f)*, units for diagnostic/laboratory services *(g)*, veterinary clinics *(h)* and dipping facilities *(i)*. Holden argues that these services "may treat several animals or process several samples at one time (i.e. low rivalry) but can exclude non-paying users from the service (high excludability)" (Holden 1999).

However, one might argue against veterinary clinics *(h)* being classified as toll goods given that services are generally paid as a function of the animal treated and the amount and type of drugs needed. Therefore, it might be more accurate to classify them into the private good category. Dipping facilities *(i)* represent

another example of the questionability of the applied allocation of goods into Head and Peston's classification as the efficiency of the product used in the dips will be reduced by increased use, hence the service is indeed rival. The first herd passing through the dipping facility will be better protected than the third. Rivalry might therefore be higher than postulated. The same can hold true for diagnostic services *(g)*, where the number of samples that can be processed at any one time is limited leading to at least rivalry in the timing of consumption of the service (i.e. some consumers may have to wait until their samples will be processed). The characteristic of these examples lead to Buchanan's theory of clubs (Buchanan 1965), which is based on a classification of goods which uses the degree of consumption sharing of a good among a certain population. This classification will be further elaborated later in section 2.3.1.3.

Because of their high excludability characteristics, toll goods are usually financed privately by the consumer. The same argument would apply to these goods in relation to the end user payment as was used for the provision of private good, namely that in remote rural areas these services would not be economically reachable for subsistence livestock keepers. Most of these services, though, exist in highly productive areas. Aggregated demand in such settings is high enough to enable market competition; nevertheless some public sector co-financing might be needed in the first phase of establishment of these facilities given their high set-up costs.

It is when talking about categories B (common pool goods) and D (public goods) that we encounter most difficulty in classifying goods into separate and distinctive cells following Umali and Holden's rationale. Given the nature of common pool goods, non-paying users cannot be prevented from using the good

or service, while increased consumption of the good diminishes supply for others. As non-paying users cannot be prevented access, there is no incentive for the consumer to pay for the service. Hence people tend to 'free-ride'. Trypanosomosis control on communal land using traps, targets or aerial spraying *(j)* to make the land accessible by cattle is an example mentioned by Holden. In one sense this example would perfectly fall into its assigned category. However, trypanosomosis control may have positive externalities not only related to decreasing cattle mortality rates but also by lowering the occurrence of (human) sleeping sickness. Therefore, trypanosomosis control may not only have characteristics of a common pool good but also of a public good if its zoonotic disease aspects are considered.

Due to the low excludability of public goods, access to their benefits cannot be restricted to the people paying for them. Thus, as with common pool goods, there is a tendency for some people not to pay for the good or service and free-ride. These situations tend to lead to under-provision or no provision of such goods by private providers. The control of highly contagious animal diseases with high mortality rates and severe socio-economic implications (for example Rinderpest), and of zoonotic diseases would fall into this category. In the event of occurrence of such diseases, the socio-economic and/or public health repercussions for the nation can be high, which might be especially important in developing countries given their relatively high contribution of agriculture to wealth generation and employment. State intervention through a form of taxation can force all beneficiaries to pay for the good or service. Therefore, vaccination, surveillance, quarantine and movement restrictions for epidemic diseases and the control of zoonotic/food-borne diseases tend to be covered through state finance. When focusing on the control of food-borne diseases *(l)*,

Holden rightly mentions that this task has "traditionally been considered as public good as the state benefits from lower health care costs" (Holden 1999) in addition to the difficulty, generally, in individualising the source of the public health damage. Food-borne scares have recently put pressure on governments to control the eventuality of such public health hazards. Therefore there is a tendency to rely on standards and regulatory frameworks that put legal pressure over producers and retailers to ascertain a level of health standards (Henson and Caswell 1999; Loader and Hobbs 1999). Along these lines or reasoning, Holleran shows the incentives for food-processing companies to adopt food safety and quality assurance standards, thus moving away from the traditionally state centred control (Holleran, Bredahl and Zaibet 1999).

However the above examples of public goods raise the issue of who is the end beneficiary of animal health services: society as a whole, the population of farmers or the state government? To put it differently: What 'public' is referred to when talking about 'public goods'? The example of an outbreak of foot-and-mouth disease (FMD) in a meat exporting country may be taken to illustrate this point. In the event of an FMD outbreak in this country, the poorest consumers may be the main beneficiaries as prices of beef and other exported bovine products are likely to fall as export markets close down. However, farmers and governments will not benefit as export bans will be imposed, reducing their economic benefits (lower prices for beef in the case of cattle farmers and less revenue from export duties for the state). Hence, there are distributional issues pointing out that Holden's strict categorisation is indeed difficult, highlighting the various degrees of publicness of goods.

The above example relates to the previously described influence of powerful 'interest groups' over decision-making processes (section 2.2.4). Economic theory defines a good as 'public' when it affects society as a whole. The extent to which an export ban due to an outbreak of FMD negatively affects society as a whole is debatable and will vary between countries. In most instances, the control of epidemic livestock diseases, although requiring government participation to put into place the adequate legislation for avoidance of free-riders and enforcement of control measures, provides a 'public' good only for a subset of the society.

Although the financing of public goods will need to be of public origin, the actual delivery of the good or services can be contracted out to private service providers. At this level, regulation and enforcement are of crucial importance to guarantee the quality of services delivered. Regulation and quality assurance are not always simple and an added incentive for the provision of quality services is through enhancement of consumer awareness about the service they can expect. The BSE episode in the UK represents an important example of power shift from an industry to consumers. Consumers' associations pressed for increased transparency in relation to the origin and processing methods of food products. As painful as the episode might have been, the results are that consumers are more 'educated' and sensitised in relation to hazards coming from the food they consume. They therefore demand the enforcement of regulations for consumer protection, diminishing the power of the food industries in the decision-making processes.

It must be remembered that the economic nature of given services is dynamic. Rivalry and excludability of a service are subject to change over time. Development of new techniques for disease control, changes in the regulatory

framework or in the information environment may alter a good or service nature. An example of technological improvement is trypanosomosis control. Originally, trypanosomosis control was carried out through aerial spraying, benefiting all farmers in an area, regardless of who had paid for the service (i.e. low excludability). However, technological advances have led to the development of drugs and 'pour-on' insecticides, therefore changing the degree of publicness of trypanosomosis control as the intervention can be more 'individualised' and therefore of higher excludability (Holden 1999).

Head and Peston's technique might be questioned in so far as the "same 'good' may fall into one category under one set of circumstances and into another category under other sets" (Peston 1972). Even so, within the different categories it is possible to develop the requirements for efficiency in provision. Perhaps the most susceptible category for that is category C (Buchanan and theory of clubs). Valid as it might have been, Umali and Holden's categorisation of goods, as it has been argued, can be contested. Two main questions derive from the above debate that might shed light on the reasons for failure of the privatisation process. These are: (i) For whom is a good "public" in the AH sector (i.e. what is the targeted population)? and (ii) What is the context (physical and/or institutional) in which it has to be delivered?

The following sections will re-examine the classification of goods taking into account the two above questions and will highlight their implications for policy making.

2.3.1.2   *Mixed goods/quasi-public goods*

The second type of approach to the classification of impure public goods focuses on the mix of services that stem from the provision of the good. This approach was first taken by Musgrave (1969) and in the AHS field it has been adopted by Leonard (2000) and Koma (2000). Research of the latter in Uganda strongly suggested that the method of conceptualising goods based on their externalities is preferable to the initially used public-private good categorisation. The reasons stated were, first that the externalities approach provides a gradient of differences between goods, given that public versus private classification is categorical and handles mixed-goods types awkwardly; and second, that the approach "leads one to do a better job in evaluating the adequacy of private demand, because it quantifies rather than categorises both internal and external benefits" (Leonard 2000). However, Bohm's results to a test involving five different approaches to estimating the demand for public goods showed the well-known risk to its misrepresentation of preferences (Bohm 1972).

Starting with two abstract examples, extension *(c)* and research *(d)* have shown the difficulty of categorising goods in separate 'cells' following the public-private good technique. The outcome of research might have characteristics of a private good in that a patent on a product results in economic profits for a specific company. However, at the same time, it enhances knowledge on, for example, disease prevention and treatment. This has external benefits therefore bears characteristics of a public good, as the whole society will profit from it. Similarly, education/extension directed towards individual farmers might have the potential of increasing the farmer's future production and income. But at the same time it may, for example, (i) limit disease outbreaks which could have

affected other farmers or even a nation's economy, (ii) might increase future generations' knowledge regarding production management and (iii) facilitate basic research, creating non-rival and non-excludable knowledge or information which benefits others in the community. Of course, it can be argued that these examples are distant consequences of extension and education, and therefore disagree with the classification of impure public goods in relation to their degree of externalities.

This perspective contrasts with the previous categorisation as, in the case of extension, public good characteristics were considered only if the extension messages were broadcast (radio etc.) and were classified as private goods only if given to farmers individually. A more concrete example would be a farmer who vaccinates his herd against Contagious Bovine Pleuro-Pneumonia (CBPP). He benefits from the protection conferred to his animals, but at the same time as he creates a personal benefit he may also create an external benefit in so far as the chance of infection of the neighbouring herds is diminished. It is clear that the external effect of the consumption of a private good (the vaccine) may bear characteristics of public good. Recognition of private-public mix means that goods can be viewed as having private benefits as well as external effects, which support the characteristic of public goods (for a clear distinction between public goods and externalities see (Evans 1970).

This externality approach to dealing with the blend of privateness and publicness in goods was dealt with by Musgrave in 1969 and its significance lies in that it provides a framework for policy purposes. It would allow the effects of a new policy to be determined by calculating the costs and benefits of its introduction. However, given the pervasive characteristics of externalities, operationalising

this approach may prove to be difficult. One attempt may be to take the ratio of spillover benefit to private benefit and classify items in a range order between 1 and 0 (Cullis and Jones 1998). Measuring the effect of spillover at different levels (animal and human) might be a cumbersome and debatable task, although one way to approach it would be through cost-benefit analysis (CBA), taking "the ratio of external benefits to private benefits as an indicator of the private-public mix and the extent of publicness" (Cullis and Jones 1998).

CBA can be used in the 'private' (i.e. firm level) as well as in the 'public' (i.e. government) context. In the case of 'private' CBA, the objective is to decide whether to undertake investment in the context of a particular firm, in the case of livestock a farm. In the public context, social CBA is a useful tool for deciding which policies to implement. Pearce, in the field of environmental economics takes a comparative approach to the use of CBAs in evaluating public interventions between the US and the UK (Pearce 1998). Two main differences have been put forward between firm level and social CBAs (Stiglitz 2000). First, in relation to 'private' CBA, profitability is the major concern whereas, in the government context, concerns focus on a much broader range of consequences (e.g. public health, environment, equity, etc). Second, while 'private' CBA uses market prices for evaluating costs and benefits, social CBA often cannot use market prices in evaluating projects, especially for outputs and inputs that are not sold in the market (such as clean water or lives saved). Social CBA focuses on developing systematic ways in which costs and benefits can be analysed when market prices do not reflect social costs and benefits (Stiglitz 2000). However, this technique is not exempt from criticisms (Boardman, Greenberg, Vining et al. 1996; Pearce 1998).

When talking about the evaluation of public expenditure through CBA, concerns focus on how governments 'should' evaluate different expenditure projects. CBAs have been established on the hypothesis that governments search "benevolently to maximise social welfare" (Cullis and Jones 1998). It is a framework in which to incorporate the various considerations arising when evaluating projects' desirability. However, "no claim is made that it is a perfect instrument, capable of yielding unambiguously correct estimates of change of welfare associated with different investment programmes" (Cullis and Jones 1998). It should rather be viewed as a method for governments to tackle the questions arising when appraising public sector investment.

Two problems arise in CBA in the public context. First, and in relation to positive economics, problems occur when trying to estimate social benefits obtained from a certain animal health intervention. In the case of performing CBAs for an animal health intervention, the obstacles and criticisms, and especially technical difficulties and surrounding controversies, will arise from (i) giving an economic weight to a certain human health condition (in the case of zoonosis), (ii) to give an economic weight to the consequences in human health due to protein loss for human diet as a consequence of animal mortality or productivity loss, (iii) to evaluation of the health care costs incurred due to the (human) disability condition and (iv) estimating the social costs experienced by an epidemic animal disease which, for example, bans animal and derived products exports for a determined period of time. This is not an exhaustive list, therefore other causes may feed into the above-mentioned controversy. In other words, the problem relates to how investments are *valued*. Several authors in the AH field have attempted to make the case for further elaboration of CBA techniques in relation to animal healthcare services (Marsh 1999; Morris 1999; Rushton, Thornton and

Otte 1999). However, as argued by Ramsay, Philip and Riethmuller (1999), most of the existing studies lack carefully documented analysis and procedures or, as mentioned by Roth (personal communication, 2002), there is a lack of reliable data.

Second, and in relation to normative economics, CBAs are not exempt from political influence and interference (Pearce 1998). The question behind the use of CBA for normative issues is that of *which* investment should be chosen. Hence, the public choice analysis of how investment is *chosen* is related far more to political costs and benefits (Cullis and Jones 1998). As mentioned by Cullis and Jones (1998), "the fact that government departments invest time and effort when undertaking cost-benefit analysis does not preclude the possibility that they are motivated far more by political factors than by welfare economics" (Cullis and Jones 1998) and highlights the susceptibility to regulatory capture from powerful industries.

In a similar way, but approaching the problem from the opposite end, Weisbrod tried to use the way in which goods are financed as an indicator of the public and private benefits of a good or service (Weisbrod 1988). The more public the benefits of a good are, the less organisations will finance themselves through sale of the good, as there are no direct property rights that can be enjoyed on a non-excludable basis. Therefore, the more an organisation relies on gifts, grants and donations, the more public are the effects this organisation has. Weisbrod argues along these lines to defend the subsidy given to not-for-profit organisations. An example of this perspective in the AH field would relate to the 'split-financing' of FMD eradication in Europe.

The 'quasi-public good' perspective differs from the public-private categorisation

of goods in that it tries to evaluate in economic terms the private-public mix of

benefits stemming from a policy intervention. This implies that context, both

physical and institutional, is taken into account in the evaluation, as well as

assessing the 'blend of publicness' of consequences deriving from it. Therefore,

this taxonomy type may well serve as a tool for decision-making processes in the

animal healthcare sector. However, what this approach does not take into

account are the arrangements related to optimisation of resource allocation at

lower levels within subgroups (i.e. service provision level). This is explored next.

2.3.1.3   Consumption sharing

The third approach to classifying goods and services was developed by Buchanan

in 1968. He portrayed the relationship existing between the degree of

indivisibility and the number of people consuming the good or service (figure 2)

(Buchanan 1968). His categorisation was based on the assumption of a given

population and given property rights. Special attention should be drawn to

situations (2), (3) and (4).
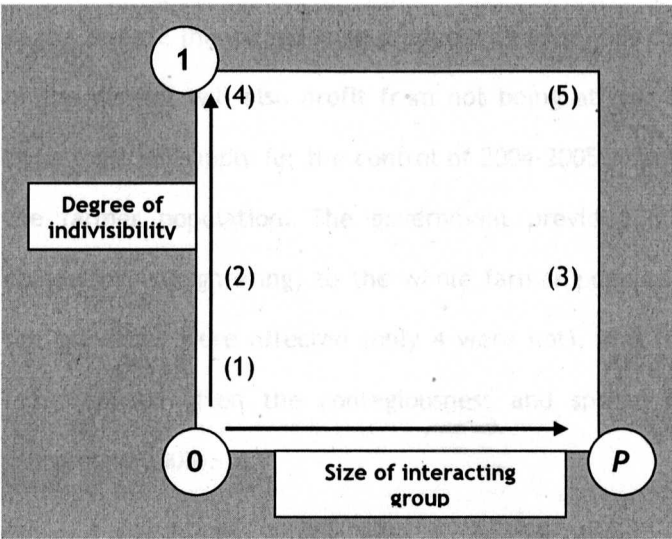
Figure 2: Consumption sharing (adapted from Buchanan 1968)

In essence, the key of Buchanan's theory is the degree to which consumption sharing is possible in a given population. The perspective taken here when applying Buchanan's theory to AH services will focus on farmers or livestock keepers.

Item (1) refers to private goods or services that are fully divisible between few individuals (or farmers). An example for the AH service would be clinical treatment or diagnostic tests for a given farmer. Evidently, tests are done to the animals, but the farmer is considered as an entity by itself (might well also be called farm). Services that are fully divisible between farmers or livestock keepers 'should' be left to market provision. On the other extreme, item (5) relates to public goods, completely indivisible over a large group of people. An example would be trypanosomosis control in a specific district, which would be fully indivisible between livestock keepers, and each farmer, as well as the rest of the population of this district, will profit from the services. In that case not only livestock keepers or farmers will profit from not losing their animals because of the disease (hence reducing productivity loss), but collaterally the inhabitants of the district will also profit from not being at risk of sleeping sickness. The same logic will apply for the control of 2004-2005 AI outbreak in Vietnam among the farmer population. The government provided control strategies (mainly compulsory slaughtering) to the whole farmer population given that almost all the provinces were affected (only 4 were not), and the strategy could not be individualised given the contagiousness and spread of the disease (Riviere-Cinnamond 2005).

Item (3) may refer to services such as vaccination against a highly contagious disease, which provides a degree of protection for all neighbouring farmers. This category could apply at a later stage in the AI control strategy, when the emergency situation is under control and farmers can vaccinate their animals. This however applies to countries where OIE list A diseases are endemic. Otherwise, in Western countries, vaccination strategies (e.g. for AI) are not allowed.

When focusing on group (2), extension services at a community level might be taken as an example. Extension (a relatively indivisible service) under these conditions may be given to a small number of livestock keepers. Hence, services are shared between a small number of people. Following Buchanan, service provision in this category might be left to voluntary arrangements between the individual members of the small group concerned, in this case livestock keepers.

Category (4) contains goods or services that are highly indivisible and are used by a small number of people. These are the so-called 'Clubs'. These could be cooperatives or farmers' associations where, for example, dipping facilities could be used by all members (i.e. those who have paid a premium or fee). The service will be provided as long as the number of members is not excessive (i.e. no congestion). However, it could be argued that the effectiveness of the dipping product diminished with use, thus incurring some level of rivalry. Clubs are arrangements in the private sector by which goods are to a certain degree non-rival in consumption and voluntarily provided. Typically the good is excludable (i.e. membership fee) but this is by no means private (i.e. below capacity limits consumption is non-rival). Buchanan contributed to the understanding of the

establishment of efficiency conditions for the provision of such goods via clubs (Buchanan 1965).

Viewing impure public goods in this way enables consideration of the appropriate provision of a range of goods bearing both 'public' and 'private' characteristics. In some instances this approach has called into question the appropriate role for the public sector. Goods that are not perfectly public might perhaps be better supplied through the market. On the other hand, there are some conditions under which it might be appropriate for governments to provide private goods. This is going to be elaborated in the next sections, especially looking at the case of remote rural areas.

2.4   Publicly-provided private goods

Prior to the drive towards privatisation animal health systems initiated by the World Bank, component services tended to be mainly funded and provided by government. As mentioned in section 1.1, this has been particularly the case in sub-Saharan African countries prior to the 1990s. Conversely, in Asian countries these services continue to be financed and supplied mostly by the government[4]. The remainder of this section will focus on ways in which governments are theoretically able to control over-consumption of publicly provided private goods. The analysis also aims at providing options to limit the negative consequences the privatisation process might have in remote rural areas. This does not imply, however, that AH service delivery in remote rural areas was of high-performance prior to privatisation.

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[4] In India privatisation has started to a certain degree.

Following economic theory, publicly provided private goods or services are those for which there is a large marginal cost associated with supplying additional individuals. An example is service delivery in remote rural areas where the costs of reaching an additional farmer might be high. Though the costs of participating in a market (for example distance deters private involvement as transport costs are higher the farther places are - e.g. pastoral setting - thus hindering profitability) provide one of the rationales for public supply of some of these goods, it is not the only or even the most important rationale. Sometimes when governments provide a private good publicly it simply allows individuals to consume as much as they want without charge. Hence, if provided publicly there is a tendency of over-consumption. In some cases this over-consumption might be limited as in the case of water supply (where satiation can be reached), but in the case of animal healthcare market the distortion from over-consumption may be very large.

When there is a marginal cost associated with each individual using a good, it may be more efficient to provide the good publicly and finance the good through general taxation. However, providing the good publicly may cause distortion (Stiglitz 2000). In the human health setting, Evans provides an example where the high costs associated to private markets providing insurance has been used as an argument for the public provision of insurance (Evans 1984). The role of government in the context of pastoral and remote areas is discussed next, first for the case that the privatisation process has not yet been fully implemented and, second, for the case that such process has already been undertaken.

2.4.1 The case of remote rural/pastoral areas

In most developing countries animal healthcare was publicly provided before the 1990s. As a result of the macroeconomic context and the crisis of national public finances, an abrupt process of privatisation of most government services, including animal healthcare, was initiated. The fact that there was a very short or even no transition period from public to private service provision in the animal health sector, caused serious disruptions in many areas. Especially vulnerable were the remote rural areas where, after government pulled out, no animal health service was available with the exception of some NGO initiatives.

As outlined in the introduction chapter (section 1.2), it is interesting to compare the process in the AH field to its counterpart in human healthcare. Structural similarities exist between the two systems which help pinpointing failures in the AH. Nevertheless, an extensive comparison of the service delivery branch will be elaborated in chapter 4. The next sections focus on the role of the government in rural and remote areas under two different settings.

2.4.1.1 The role of government in a pre-privatisation setting

Continuing the comparison with the human health care sector, rationing devices were progressively introduced in the human health field through Primary Health Care (PHC) programmes with the aim of cutting healthcare costs. In the human healthcare system, PHC refers to the first point of access or attendance of care. Secondary health care refers in the same context, to services offered in hospital facilities. Measures to reduce demand, either from suppliers or patients, were therefore implemented. Such planning was missing during AHS privatisation in most nations.

In countries where privatisation of AHS has not been yet fully or even partially implemented, i.e. cases where 'private' animal health services are still being provided to a certain extent by the government, there are three ways in which the government could control the (over-) consumption of publicly-provided private goods (Stiglitz 2000). These are (i) rationing consumption (i.e. user charges), (ii) uniform provision, and (iii) queuing.

As previously mentioned, inefficiencies arise from over-consumption of publicly-provided services. In the HHS, governments imposed *user charges* on services provided in order to reduce or limit their consumption and hence government expenditure. Independently from the controversy surrounding the use of charges (especially with regard to low income earning people, equity issues arise when referring to user fees), rationing methods could have been used during the transition process to limit the 'superficial' demand for animal health services (though this has been questioned by Abel-Smith in the context of Tanzania (Abel-Smith and Rawal 1992). In the same way that the introduction of charges would have limited demand, it would also have helped to increase the government's budget (at a local, regional or national level, depending on the country's decentralisation status) for animal health services and using the public funds for targeted public good interventions. It should however be mentioned that partial cost-recovery methods have already been introduced in some AH delivery programmes.

Uniform provision refers to supplying the same quantity of the good to everyone. However, this mechanism does not allow for adaptation of different individual's needs and desires, as the private market does (Stiglitz 2000). This characteristic

is of most importance in the animal healthcare field as the needs in different rural or pastoral areas might greatly vary. A government policy of uniform provision of animal healthcare services would not be advisable.

Finally, the third way through which the government might control over-consumption of publicly provided services is through *queuing*. The underlying rationale is that, rather than charging individuals for access to publicly provided services, the government requires that they pay in waiting time. This measure is based on the idea that money is an undesirable way to ration medical related services. Queues are supposed to be an effective device to discriminate between those who are truly needy and those less in need. Willingness to pay (WTP) is thus here replaced as a criterion for allocating medical services by 'willingness to wait' (Stiglitz 2000), which in turn can be a basis of priority. However, one might argue that waiting time incurs alternative social costs to the government that might be higher than with other rationing devices (such as time away from work).

In the case of animal health services however it does not seem reasonable to make herders and livestock travel long distances to reach veterinary assistance as diseased animals may not be able to walk or will lose too much weight and condition during the trip, or even further disseminate and spread the disease. Similar arguments regarding costs associated to reaching health services were put forward by Abel-Smith (1992). He stated, in the Tanzanian and Swaziland context, that "an additional important cost is time away from other activities, which can be very important not only for those who lose cash earnings when away from work, but also for subsistence farmers and, not least, from mothers taken away from their household activities. A further costs if that of travel for certain patents" (Abel-Smith and Rawal 1992). Most herders would therefore be

more interested in selling the diseased animal at a lower price or slaughter it (without inspection, therefore possibly incurring human healthcare costs), rather than risking its complete loss. Hence, costs incurred due to the lack of access or the waiting time to receive animal health services may impact at the individual level (loss of the economic value of the animal), at the community level (as livestock has high social value in these areas) and at national level. In relation to the latter, if herders do not have access to animal health services, or have to wait for the services to come to them (in the case of community-based workers or other services), an outbreak of an epidemic disease such as Foot and Mouth Disease (FMD) or Rinderpest would go undetected and uncontrolled for longer than necessary thus increasing the risk of substantial spread. If the outbreak is not contained, the entire nation's exports might be hindered due to the imposition of an export ban. Therefore, the consequences of this 'waiting time' would have high social costs at a national level.

The underlying assumption for public provision of private goods or services is the existence of an 'efficient' government. It has been shown that many governments fail to provide services efficiently as they incur high transaction costs related to political and individual interests. Quantification of transaction costs to compare differences in efficiency between market and government provision of goods or services might, however, be technically and practically difficult.

Applying user charges would therefore be the main device to help limiting government expenditure, hence slowly moving towards a more privatised system where government would play an added role, concentrating on provision of goods with high degree of publicness.

2.4.1.2   The role of government in a post-privatisation setting

In countries where privatisation of AHS has been undertaken, there is a need to explore ways in which the delivery of services can be improved and their financing can be secured. As in the previous section, special attention is given to remote rural areas. Given the physical context encountered in these areas (lack of infrastructure, water, electricity and often the presence of high insecurity) it would seem there is a rationale for public provision of animal healthcare. Following Williamson's economics, what is being advocated here is the action of the government as an overall coordinator. Additionally, another role for the government would be facilitating the institutional context.

The first role would involve the remaining government animal health services in rural areas as well as at other levels such as district and national. These could play a key role in decreasing the existing transaction costs by coordinating current ongoing field activities. These activities might range from private or business-oriented delivery of animal health service, to NGO initiatives. Examples of this coordination role would vary from setting national goals for delivery of primary animal healthcare (PAHC) (such as integrating into a common PAHC goal the existing programmes, be they private or not-for-profit), to more logistical activities, such as facilitating networks for drug supply.

The second activity, which in turn relates to the previous one, is facilitating an institutional context for Primary Animal Health Care (PAHC) delivery. The PAHC concept refers to the AH system's service delivery branch. That is: the first contact point for livestock keepers with AH services. PAHC would therefore

include initiatives such as community-based animal health (CAH) systems (which might be business oriented, NGO managed or government run), veterinary aid centres, mobile dispensaries, etc. The nature of PAHC will differ between countries. Hence for example in sub-Saharan Africa PAHC will mainly include CAH systems as AH service delivery branch, whereas in India veterinary aid centres and mobile dispensaries will be more common. This function is of interest for developing countries as it might help rural livestock owners accessing regional markets (i.e. in the same country or in some instances in neighbouring countries). However, other factors are needed (such as transport and infrastructure) and that does not exclude the existence of illegal export markets. For stockowners to be able to sell their livestock and derived products in these zones there is a need for a coordinated and integrated animal healthcare service at a national level so as to assure minimum quality standards in live animals and derived products. Of course, one might argue that in some of these localities official inspection is lacking and, if to some extent it exists, parallel markets tend to arise due to the lack of enforcement. Delivery of AH services in remote rural areas therefore represents a challenge in terms of AHS reliability to reach these standards. An interesting case is that of Kenya and the acceptance of CAHWs. Although this will be expanded in chapter 5, reluctance exists from some members of the Kenyan Veterinary Board (KVB) to legalise and integrate CAHWs in the Veterinary Act, in spite of the latest recommendations of the Office International des Epizooties[5] (OIE) in relation to veterinary para-professionals (OIE 2003). If these para-professionals are not legally accepted (and in practical terms adequately supervised, which would relate to the organization and structure of CAH systems, especially in relation to the supervision of CAHWs by qualified professionals) there is the possibility that livestock and derived

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[5] French acronym for the World Animal Health Organisation

products may be rejected in local or regional markets on public health and/or animal health grounds.

There is, nevertheless a need to assess effective ways to increase government resources for funding animal health services. There is also the need to explore existing and new possibilities for the private sector to fund and provide these services.

2.5 Conclusions

This chapter demonstrates that the application of economic analysis to AHS has moved from an *outcome*-oriented perspective of earlier contributors towards a more *process*-oriented point of view. Hence, the animal healthcare market is viewed in a broader context where political interference, self-interested behaviour and other transaction costs are considered. This relatively new perspective (in the AH sector) leads to the identification of factors that were not taken into account in the first economic analyses of AHS. These factors that may however have had some influence on the failure of the privatisation process in some countries.

The public choice school's perspective gives a new approach to the analysis of the animal healthcare sector. Central to the public choice school is the view of the government as part of the AHS market and not only as an external agent with regulatory power. It sheds light on how to avoid errors in ongoing and future privatisation processes. This perspective contemplates the government as a key element in harmonising and facilitating the market economy, hence as a means for reducing existing transaction costs. An important factor to be taken into account relates to corruption at a governmental level. Additionally, the analysis

provided in this chapter has put forward the consequences of regulatory capture whereby governments may be lobbied by private businesses.

Hence, deriving from the analysis elaborated in this chapter, it can be concluded that the application of economic theory to guide the process of privatisation of animal health systems varies in relation to several factors and the privatisation process cannot to be applied in a homogeneous way. Influencing factors such as the physical, political and institutional contexts need to be taken into account. There is no standard model applicable to the privatisation process.

Furthermore, the role of government should be viewed at a broader level as coordinator of activities in the animal healthcare sector (increasing cross-sector collaboration), the aim being not only to reduce transaction costs, but also, and especially, to guide current initiatives towards a common goal for AH systems. Thus, in countries that have not undergone privatisation, cost-containment measures could be applied in order to smooth the transition process to a privatised AH market (where applicable). Conversely, in those countries where privatisation has been undertaken, efforts should focus on governance of the AH systems (although this is elaborated in further detail in chapter 4 in the context of community-based service delivery).

Nonetheless, the discussion chapter 6 will further discuss Stiglitz's market failure approach in the context of government and the degree and type of intervention in the animal health arena.

Having analysed AHS from an economic perspective, there is a need to understand the ways in which AH systems are organised and financed. This refers

to the main actors, their relations and implications, as well as the AH structures driving these systems. Closely related is therefore the alternative ways in which AH systems are financed. The manner in which systems are organised and financed influences their performance. This is explored in the next chapter.

3 Funding mechanisms for animal health systems

3.1 Introduction

3.1.1 Background

"Since the early 1980s, total meat and milk consumption grew at 5 and 3% per year respectively through the developing world. In East and South-East Asia, where income grew at 4-8% per year, population at 2-3% per year and urbanisation at 4-6% per year, meat consumption increased between 4 and 8% per year. Between 1983 and 1993, the share of the world's meat consumed in developing countries rose from 37% to 47%, and the share of the world's milk [consumption] rose from 34 to 41%" (Delgado, Rosegrant, Steinfeld et al. 2000). According to the International Food Policy Research Institute's (IFPRI) projections, by 2020 people in developing countries will produce on average 40% more meat and 60% more milk per capita than in the early 1990s (Delgado, Rosegrant, Steinfeld et al. 1999).

These trends in the animal production sector are, unlike most other movements (i.e. the "Green Revolution"), demand driven. Forecasts have led the international scientific arena to label the change as the 'Livestock Revolution' (Delgado, Rosegrant, Steinfeld et al. 1999). What this new food revolution implies is a considerable growth in livestock production and processing of derived products. The implications of such an increased production are several and have been extensively debated by Delgado, Rosegrant, Steinfeld et al. (1999). These include various issues such as: (i) nutrition, food security and poverty alleviation,

(ii) environmental sustainability, (iii) world trade and food prices and (iv) public health.

Such production forecasts also have implications for AH systems. It seems obvious that this production increase will lead to higher demand for animal health services. The governance of AH services therefore needs to be effective and efficient to assure quality services and minimum international trade standards, and to minimise public health and environmental risks.

There is, however, a significant deficit in information about how animal healthcare services are financed and data on how funds are collected and managed is scarce. Very few analyses have been performed in the animal healthcare field on funding mechanisms and related available options (Anteneh 1984). Those countries which undertook the process of privatising veterinary services have seen their previously frail funding allocation further diminished. Hence, most departments of veterinary services (DVS) are currently pleading the case for an increase in their budgets (Leonard 2000; Gimeno 2003; Sidibe 2003). The increased demand for AHS that is associated with the 'Livestock Revolution' emphasises the need to analyse existing and innovative ways in which funds may be generated in order to present options that could be feasible and acceptable to developing countries.

The underlying comparison to the human health field is the focus of this chapter. As previously mentioned, similarities between the two systems (animal and human) have been highlighted in earlier papers (Leonard 2000). Furthermore, Leonard (2000) stated that "the two professions [human and animal medicine] are close enough that [their] differences help each to look at its own structures

and operations in new and illuminating ways" (Leonard 2000). The theoretical frameworks used for analysing human healthcare (HH) markets can then be used to illustrate the mechanisms underlying the animal healthcare (AH) market. The chapter therefore draws on those frameworks used in the human healthcare field to describe the performance of animal health systems.

This section explores not only the agency theory relationships between actors in the animal healthcare market, but also the options available to decision makers for raising revenue for AHS. Special focus is given to the implications of choosing one funding mechanism over another, or more usually the implications of a particular mix-funding source mechanism. The study draws from the extensive literature existing in the human healthcare field, and the meagre literature that relates to the AH field. Regarding the latter, information was gathered through a literature review on AGRIS, AGRICOLA databases as well as CABI abstracts. In addition, documentation obtained from FAO, OIE and AU/IBAR was also used. In addition, a questionnaire was elaborated in order to elucidate taxes associated to animals and animal products in developing countries. The questionnaire was elaborated with the help of FAO staff members and was tested in Guinea. It was performed in Senegal with the help of the hub coordinator based in Dakar. A local consultant was contracted to gather the information and identify the appropriate persons to respond to the questionnaire (the questionnaire may be found in the annex section). The results of the questionnaire are presented in the core of the text in section 3.4.2 where specific examples of taxation associated to animal health are described. Finally, several personal communications, especially regarding the financing of FMD episode in the UK (2001) were obtained through FAO contacts.

Other distinctive features of this research are that it combines public finance theory (Musgrave and Musgrave 1989) and empirical evidence, provides examples of current structures (and surrounding debates) of AHS, brings together issues related to animal and human health and examines the relationship between funding and resource allocation.

Questions that arise and that are addressed in this chapter are the following: How are AHS funding mechanisms organised in different countries? Are there different patterns or 'models' of funding AHS? How may revenue be collected and allocated for animal healthcare services? What is the relationship between the different sub-components of some financing structures? What are the implications of such funding mechanisms in terms of equity and efficiency?

3.1.2   Objectives

The objectives of the chapter are threefold:

1. To explore the use of the agency theory in the animal health care market;

2. To describe the functional components of animal healthcare systems, highlighting the inter-relationship between the components;

3. To analyse different mechanisms for raising revenue in support of animal healthcare systems.

3.1.3   Organisation of the chapter

The chapter is divided into five major sections. Section 3.2, which follows this introduction, describes the components and actors involved in the animal

healthcare sector and their interactions. Hence, the agency theory is applied to the animal health actors.

Section 3.3 introduces a framework for assessing the different components and sub-components involved in the financing and provision of AHS. The focus is on describing their influence on the performance of health systems at three different levels: (i) strategic design, (ii) structural arrangement and (iii) implementation levels. The section is descriptive and based on Murray and Frenk's (2000) framework of health systems functions.

Conversely, section 3.4 takes a more practical perspective, describing the different existing funding and revenue collection mechanisms, and groups them in four main categories. This analysis, based on Musgrave and Musgrave (1989) public finance theory, also includes the implications such sources of revenue collection may have on service provision. The main focus is on evaluating the consequences of these collection methods in relation to equity and efficiency. This section includes the results of the questionnaire performed in Senegal.

Finally, section 3.5 presents the conclusions of the study and provides recommendations for improving current knowledge regarding AH systems organisation and revenue collection mechanisms.

3.2   Analytical approaches to AHS funding theory

Animal healthcare systems rely on access to human and consumable resources as well as funds to be sustainable. For these inputs to be secured, financial resources are needed to pay for equipment and buildings, to compensate animal healthcare staff's time and to pay for drugs and other consumables. The way in

which such financial resources are generated and managed (i.e. the process of collecting revenue and pooling funds) are critical issues for policy-makers and planners. These issues relate to the challenge of designing funding systems, as the process generally conveys ideas related to social policy, politics and economics.

Concerns deriving from the SAP in Africa and the subsequent implementation of a market oriented approach (i.e. privatisation) outlined in section 1.1 led to major changes in the way animal healthcare systems were organised and financed. In that context, policy-makers have three options: (i) containing costs, (ii) increasing funding for animal health services or (iii) both (adapted from Mossialos, Dixon, Figueras et al. 2002). Cost-containment through privatisation of services has been driving the policy discussions in the international arena. As for other sectors (including human healthcare), many countries do not consider large-scale public borrowing to be a sound economic policy. Hence, concern should focus on revenue policies, that is: how to fund animal healthcare systems on a sustainable basis.

Based on the definition, in section 2.2.2, of the different components included in AH systems, the interactions between actors in the sector, the implications and derived consequences are the focus of the next section.

3.2.1   Components and main actors of the AHS

Thus, as mentioned in section 2.2.3, AHS can be divided into six main categories: (i) curative services, (ii) preventive services, (iii) pharmaceutical supply, (iv) public health, (v) education/extension and (vi) research and development. What

these different components have in common are the actors involved in the system.

In order to understand their roles and interactions better, they can be classified following the "healthcare triangle" framework (Reinhardt 1990; Mossialos, Dixon, Figueras et al. 2002). Players can therefore be grouped into three categories:

(i) *Consumers* of the service (the first party): Stock owners and herders or livestock keepers. Public health issues, such as animal diseases that affect humans, imply that society in general may also be considered a consumer;

(ii) *Providers* of the service (the second party): Veterinarians and veterinary para-professionals (animal health assistants (AHAs), community animal healthcare workers (CAHWs), barefoot vets, traditional healers etc.);

(iii)*Third party insurers or purchasers* (which might be a public or private body): Government, intergovernmental, non-governmental donors or private entrepreneurs.

Stock owners, herders and livestock keepers are the direct *consumers* of the services. They can be small-scale (backyard raisers) or large-scale farmers, sedentary (mixed farm) producers and pastoralists (Leonard 1990). Farmers may be organised into producer associations, cooperatives or other forms of collective organisations whose functions may include the provision (finance and/or delivery) of animal health services, therefore playing the role of the "third party" insurer or purchaser (see later). As stated by Umali-Deininger, Feder and deHaan (1992), the general population might also be considered as a direct

consumer of the veterinary services as several livestock diseases can affect humans. These can be of bacterial, viral or fungal origin and might be transmitted through various ways (direct contact, food-borne, vector-borne, water-borne etc). Examples of zoonotic diseases include: anthrax, brucellosis, sleeping sickness, Chagas disease, tuberculosis, salmonellosis, cysticercosis, trichinellosis etc. The risks to human health caused by these diseases, and their control and/or eradication, are of public health concern (this has been pointed out by recent events such as BSE, SARS and AI). This is the reason why society in general has been incorporated into the first party element as a direct consumer of veterinary services.

Veterinarians and other auxiliaries *deliver health services* either through private channels or through government sponsored programmes. Veterinary para-professionals assist veterinarians in their duties. However, the extent of healthcare services provided by the government varies widely in relation to national regulations. Because of the limited number of trained veterinarians in some countries and/or their unwillingness to serve in rural areas, para-veterinarians become valuable workers. On the one hand, they supplement and expand the area covered by veterinarians (Sidibe 2003), and thereby increasing the number of farmers reached, freeing time for the veterinarians to treat more serious cases (Umali-Deininger, Feder and deHaan 1992). Hence, para-veterinarians contribute to limiting transaction costs arising from transport. This is of most importance in pastoral areas.

The *third party insurer or purchaser* refers to public and/or private structures. On the public side, it is normally the ministry of finance (MoF), which allocates a certain amount of money to the ministry of agriculture (MoA). This creates

competition between ministries for the funds that are to be allocated (Mossialos, Dixon, Figueras et al. 2002; Gongora 2003). The MoA is in charge of redistributing these funds to the different programmes in place. However, a certain part can be played by the ministry or department of health (MoH/DoH), depending on its existence and duties, regarding zoonotic diseases and public health education. In some instances, public health education programmes fall under ministry of education (MoE) duties, rendering the allocation and coordination between different ministries more complex. It is important to highlight that legislative and executive bodies of the government formulate the domestic policies that shape the economic and institutional environment in which livestock and animal healthcare services operate. This means that these bodies create the incentives or disincentives to private sector activities. Inter-governmental donor assistance is mainly focused on providing funding for national livestock service programmes (animal healthcare services are a component of the livestock services). Their financial assistance is usually channelled through the government thus asserting the role of government in the delivery of livestock services[6] (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992). On the other hand, regarding private sector third parties, in the animal health or livestock service field it is common to find non-governmental organisations (NGOs) funding specific programmes. They assist governments by providing technical assistance, but it is more likely to find NGOs financing livestock sector development programmes (hence animal healthcare programmes). However private entrepreneurs have started to play an important role in AHS in most countries. As previously mentioned, these can be producer associations, cooperatives or other types of

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[6] Examples of these inter-governmental organisations include African Development Bank (ADB), Food and Agriculture Organization (FAO), International Fund for Agricultural Development (IFAD), United Nations Development Programme (UNDP) and the World Bank.

collective associations. They can offer a relatively wide range of services from curative to preventive including sometimes the production and distribution of veterinary supplies.

Having described the actors in the AH field, the next section analyses their interactions and the underlying reason for them to interact.

3.2.2   The agency theory applied to animal health

Illness is unpredictable whether in humans or animals. It might be possible to predict prognoses associated with disease conditions and predict losses in economic terms due to those conditions once an animal (or herd) is affected, but in general the future health status of animals remains uncertain. Herders cannot therefore plan the future consumption of animal healthcare services as one could do with other commodities (such as food consumption). As a consequence of this inability to plan for what will happen in the future, an unregulated market would respond by developing insurance mechanisms whereby a herder or group of herders could make payments to some risk pooling agency (for example an insurance company) to guarantee some financial or economic compensation in the event of their animals falling ill. Herders cannot insure their animals against illness but they might be able to insure themselves against the financial burden of their animals falling ill. Livestock insurance (LI) thus embodies a wider concept of income maintenance. The concept of livestock insurance embodies not only animal ill-health but also animal death. Thus, as will be seen in section 3.4, animal health and insurance tend to be closely related in their financing mechanisms.

The analysis of the relationship between the above-mentioned actors starts with the financing and provision of services, which can be simplified as an exchange or transfer of resources. Providers (the 'second party') transfer healthcare resources to patients (in this case the 'first party' or consumers of the service) and then patients or insurers (the 'third party') transfer financial resources to the providers (see figure 3).
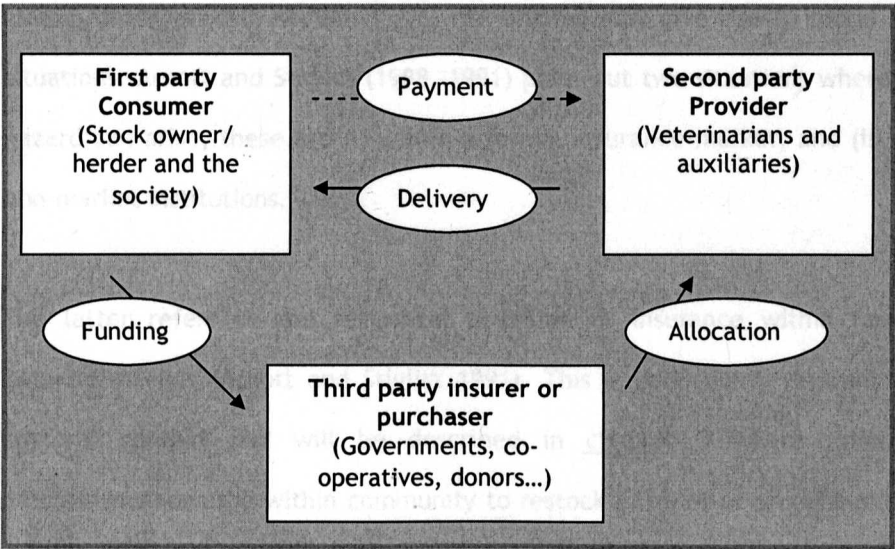
Figure 3: Agency theory applied to AHS (adapted from Mossialos, Dixon, Figueras et al. 2002)

The principal/agent theory has been extensively discussed in the human healthcare literature (Arrow 1985; Pratt and Zeckhauser 1985; Evans 1998). However, an attempt of comparison between the two health fields has only been undertaken by Leonard in 2000 (Leonard 2000). Following his reasoning, and adapting the transaction model from Mossialos, Dixon, Figueras et al. (2002) to the animal health setting, interactions between different actors in this triangle can be explained.

The simplest form of transaction is by direct payment where the consumer pays the provider directly in return for goods or services. However, healthcare systems have often developed another player: the third party or insurer. This can be a public or private body that has been created to offer protection to a population against the financial risk of falling ill. In the animal health setting this refers to the risk of animal illness and arguably the occurrence of zoonosis. This system allows risks to be shared within a defined population. Nonetheless, as already introduced in section 2.2.5, risk sharing may give rise to moral hazard situations. Arnott and Stiglitz (1988, 1991) point out two situations where moral hazard can arise, these are (i) within a formal insurance market, and (ii) within non-market institutions.

The latter refers to the reciprocal provision of insurance within family or between friends (Arnott and Stiglitz 1991). This is particularly relevant in the pastoral context and will be described in chapter 5 where "tiliantany" mechanisms are used within community to restock in times of drought or animal disease epidemics. "Tiliantany" is an 'insurance system' among pastoralists. Pokot people in Kenya (see section 5.1.3) minimise the risk of complete loss of livestock through 'loaning' cows to relatives and friends in other parts of the district in exchange of steer. The cow provides milk for the person who receives it, but calves are property of the original owner. Loaning cows to other people gives prestige to the pastoralist and more importantly it gives him the right to claim assistance from his "tiliantany" partners when needed. In such context, "peer monitoring is an important mechanism for controlling moral hazard" (Arnott and Stiglitz 1991). Arnott and Stiglitz's example refers to credit markets. However, given that in rural and pastoral areas livestock are regarded as financial assets, a similar reasoning may be applied. Hence, they argue that "in

less developed countries, loans [which in the pastoral context may well be in the form of livestock] are often made to groups of individuals; the members of the group have then an incentive to monitor each other" (Arnott and Stiglitz 1991).

Adding to the discussion in section 2.2.5, in formal insurance markets "moral hazard arises when neither the states of nature nor individuals' actions are observable [or imperfectly observable] to the [third party] insurer" (Arnott and Stiglitz 1988). Hence, the provision of insurance can have an effect the behaviour of the insured (i.e. the farmer or stock owner) modifying the precautions that would have otherwise been taken. Several examples of livestock insurance and animal health insurance are presented in section 3.4. Nonetheless, to finance animal healthcare services, the third party insurer must collect the revenue from a population set (in a direct or indirect way), which is then used to reimburse the herder or the veterinarian (or para-professional).

Indeed, as mentioned by Stiglitz, "risks in agriculture are clearly tremendously important, yet remarkably, the traditional theoretical literature has avoided explicit treatment of risk sharing in agricultural environments" (Stiglitz 1974). Livestock being a sub-sector of agriculture falls into Stiglitz's lines. It should be pointed out in addition that this sub-sector, as previously mentioned, might entail public health hazards, highlighting the aforementioned important 'risks in agriculture'.

Here the analysis focuses, not as in Stiglitz's 1974 article on the incentives for sharecropping, but on the mechanisms to avoid risks (i.e. insurance, whether formal or non-market). Therefore, central to the insurance matter are the following questions: Where should funds to sustain animal health services (AHS)

come from given that their aim is twofold: (i) protecting farmers from possible economic losses and (ii) protecting society from public health hazards? This question raises some of the main controversies surrounding animal healthcare systems funding, which is essentially due to the aforesaid mixed nature and diverse objectives of veterinary services. A theoretical framework to analyse the different functional components of AHS and how they are linked is presented in the next section.

3.3   Functional components of AHS: Implications on performance

This section introduces a methodological approach to the functioning and performance of AHS. Following the thesis rationale, the framework applied here has been adapted from the human health literature. Although several authors in the HH field have analysed health systems (Mossialos and Le-Grand 1999; Kutzin 2001; Mossialos, Dixon, Figueras et al. 2002), the choice for this section has been Murray and Frenk's (2000) approach. Reasons for that choice are based on their definition of 'health action', which has already elaborated in section 2.2.2. Such definition clearly points out the overlapping areas between human and animal health from a public health perspective.

One reason for promoting this wider view is that recent events in the developed world have raised consciousness about the organisation and performance of AH systems (as for example the FMD episode in the UK in 2001, BSE-CJDv, salmonellosis, listeriosis, SARS, Avian Influenza etc.). These concerns arose mainly due to consumers' increased awareness of the link between animal health and food safety. At the same time, and for similar reasons, developing countries

are also becoming more aware of the risks related to mismanagement of AHS (not only because of zoonotic diseases and economic losses due to poor animal health, but also because of the enforcement of international trade standards[7] recognised under the World Trade Organisation (WTO)).

The focus of this section is therefore on promoting a broader view of AHS functional components and on providing an empirical analysis of the systems while identifying the factors influencing their performance. At the same time, the economic perspective introduced in chapter 2 will be at the basis of the analysis.

3.3.1   Financing

Healthcare systems, whether human or animal, can be divided in two different functional components: financing and provision. Revenues are collected from primary or secondary sources, accumulated in fund pools and then allocated to provider activities. Three sub-components in the financial functional element may be devised. These are: (i) revenue collection, (ii) fund pooling and (iii) purchasing (see figure 4). They can be organised and combined in different ways between and even within countries. For example, functions can be integrated by a single organisational entity and in other cases one entity collects and pools the funds and other bodies purchase and provide the services (Kutzin 2001).

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[7] Sanitary and phyto-sanitary measures (SPS)
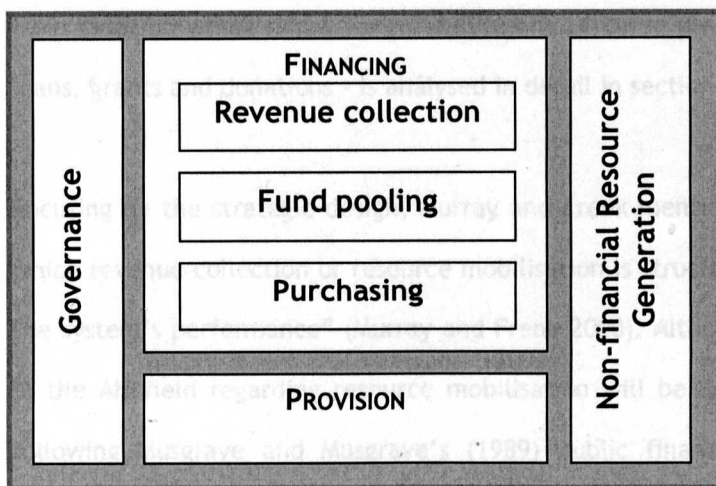
Figure 4: Health systems functions (adapted from Murray and Frenk 2000)

These three sub-functions are analysed next, as well as the provision and other possible influencing factors related to the AH sector. Following Murray and Frenk's definition of health action outlined in section 2.2.2, their rationale for analysing health system's functional components is used here in the context of AHS. Thus, especial attention is given to 'strategic design', 'structural arrangements' and 'implementation processes' as these might have great influence on the system's performance.

3.3.1.1   Revenue collection

The process of revenue collection refers to who is paying (source), how the payment is made (mechanism) and who is collecting the money (collection agent) (see figure 5). In the animal health setting, funding mechanisms include primarily (i) individual contributions through out-of-pocket payment, (ii) loans, grants and donations, (iii) private livestock insurance premiums, and depending on the country, the extent of (iv) national livestock insurance and (v) the contribution

from taxation which might vary widely (each of these mechanisms - except for loans, grants and donations - is analysed in detail in section 3.4).

Focusing on the strategic design, Murray and Frenk mentioned that the "way in which revenue collection or resource mobilisation is structured is likely to affect the system's performance" (Murray and Frenk 2000). Although specific examples in the AH field regarding resource mobilisation will be debated in section 3.4 following Musgrave and Musgrave's (1989) public finance theory, under the umbrella of social policy concerns at a decision-making level, performance of a system is related to:

(i) The *type of payment*, which can be either voluntary (for example enrolling in a private livestock insurance or cooperative association delivering animal health services) or compulsory (e.g. taxes or national livestock insurance contributions);

(ii) The *progressivity or regressivity of the payment* (for insurance premiums, for taxes – both general and hypothecated -, for compulsory contributions). A progressive tax is one in which payment increases more than proportionately with income, and

(iii) The *payment mechanism* (referring to prepaid services versus payment at point of use).
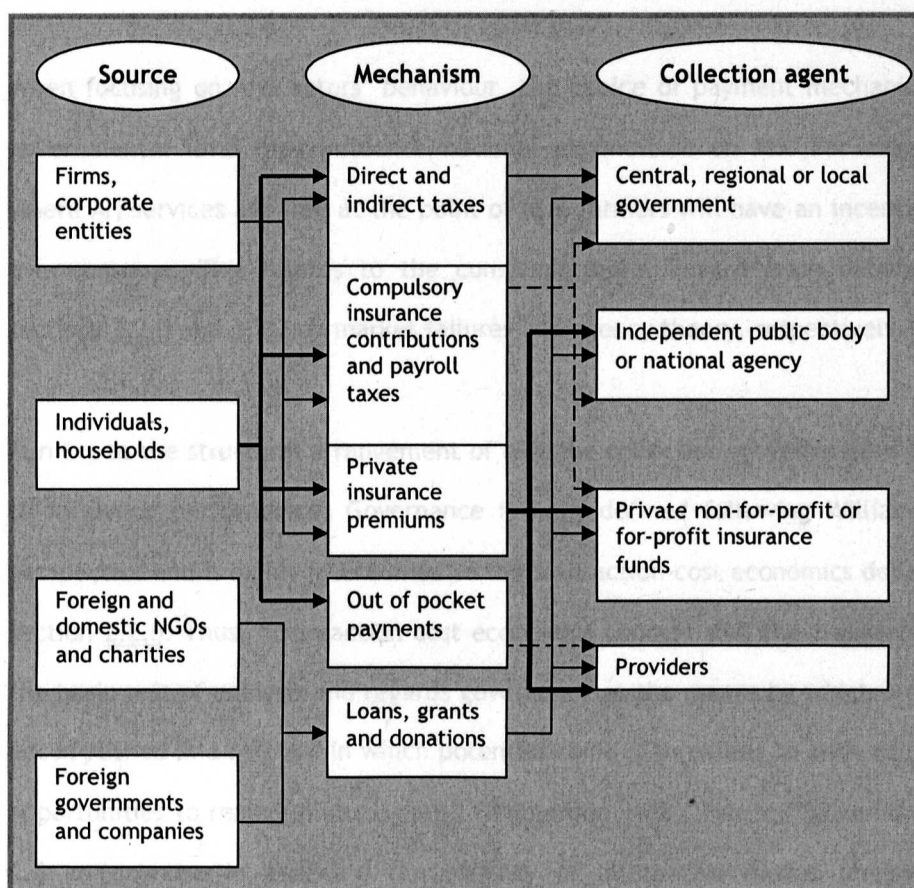
Figure 5: Funding sources, contribution mechanisms and collection agents (adapted from Mossialos, Dixon, Figueras et al. 2002)

These three aspects are highly influential on the behaviour of AHS actors as well as on the consequences at different social levels (e.g. progressivity or regressivity of payments). The latter is closely related to governments' political target and standpoint (i.e. the equilibrium between economic growth and development goals) as the method of tax collection may have considerable equity effects, especially over vertical equity, which refers to who is bearing the biggest burden when paying taxes (Musgrave and Musgrave 1989). For instance, a progressive taxation system would transfer wealth from rich to poor, thus reflecting government's concern on the ATP principle (Begg, Fischer and Dornbusch 2000) (ATP principle will also be debated in chapter 4).

When focusing on AHS actors' behaviour, the choice of payment mechanism at governmental level may influence national expenditure on AH. For example, where AH services are free at the point of use, farmers will have an incentive to over-consume. This relates to the consumer moral hazard issue debated in sections 2.2.5 and 3.2.2 on market failures and agency theory, respectively.

Turning to the structural arrangement of revenue collection, governance is likely to influence performance. Governance is here defined following Williamson's perspective and is highly intertwined to the transaction-cost economics debate in section 2.2.5. Thus, "transaction-cost economics concurs that the transaction is the basic unit of analysis and regards governance as the means by which order is accomplished in a relation in which potential conflict threatens to undo or upset opportunities to realize mutual gains" (Williamson 1998). Hence, "governance is [...] an exercise in assessing the efficacy of alternative modes (means) of organization. The object is to effect good order through the mechanisms of governance. A governance structure is thus usefully thought as an institutional framework in which the integrity of a transaction or related set of transactions, is decided" (Williamson 1996).

Although the debate about governance will be further elaborated in section 3.3.3, in the AH setting, governance is associated with the number of organisations carrying out this function. Given the definition of the structure of AHS in section 2.2.3, several "alternative modes (means) of organization" may be found. Therefore, the process of collecting revenues may involve, as seen in figure 5, several sources and mechanisms that will have different impacts in

terms of equity and efficiency. Questions arise also regarding economies of scale and concentration.

The choice of measures to avoid evasion for each specific collection procedure is a matter, at an implementation management level, that might have an impact upon AH systems' performance. Hence, Arnott and Stiglitz's (1991) moral hazard debate in section 3.2.2 (i.e. agency theory applied to animal health) arises also at implementation level in revenue collection.

3.3.1.2   *Fund pooling*

Fund pooling focuses on "the accumulation of revenues for the common advantage of participants" (Murray and Frenk 2000). Pooling resources thus highlights that funds are not related to contributors, hence there is risk-sharing. The rationale for AHS is that it facilitates the financial risk (of animals falling ill) to be shared across the farmer population or a defined sub-group. This relates to Buchanan's theory of clubs debated in section 2.3.1.3. The difference with revenue collection lies in that some mechanisms of revenue collection do not share financial risks across contributors as for example out-of-pocket payments.

A key element in the strategic design that is likely to affect the performance of fund pooling is the extent to which separate fund pools exist for different farmer groups. Additionally, the presence or absence of cross-subsidisation between low-risk and high-risk contributors (i.e. farmers) might also have an influence. For example, if revenue collection and fund pooling are integrated, the allocation from collection to pooling agent is internalised. An example illustrating this mechanism may well be a national animal health insurance

(NAHI) scheme (as that of Germany (Donhauser and Pauels 1997) exposed in section 3.4.3.2), where contributions are collected and retained by the same funds (in the case of Germany, regional funds). Depending on the degree of decentralisation in any given country, this mechanism may also apply to the collection and retention of regional or local taxes.

Regarding structural arrangements of fund pooling, key elements are: (i) the size and number of fund pools, (ii) the mechanisms of transfer of funds among pools, (iii) the choice of compensation funds for enrolment (i.e. competition) and (iv) the governance of institutions which maintain these fund pools. For example, if different agents are carrying out the collection and pooling, a mechanism is needed to distribute resources from the collection agent to the pool. If there are multiple pools, there is a need to adjust the allocation to the risk sharing among the population in relation to each pool's population risk profile. The reason behind risk-adjustment in earmarked or hypothecated tax systems is to prevent cream-skimming. In tax-financed systems, methods such as capitation have been used in human health systems to risk-adjust and hence ensure a "fairer" allocation of resources to territorial health authorities based on the needs of the population. Following Rice, "capitation can be defined as the health service funds associated with a plan member for the service in question and for the time period in question, subject to any overall budget constraint. A capitation system puts a 'price' on the head of every member" (Rice and Smith 2002). A similar method may well apply to the AH setting and would generate even less surrounding controversy than in the HH field.

At an implementation level, the way in which the rules guiding entry and exit of those organisations performing the fund pooling function are set is likely to

affect performance. For example, should the rules guiding entrance limit the number of fund pooling organisations in the market to the extreme of monopoly, competition will thus be limited and premiums likely to the higher than expected in market conditions. This would include the procedures that protect contributors (farmers) from insolvency or bankruptcy due to loss of animals or enforcement of compulsory slaughtering (an example is provided in section 3.4.3.2 with Germany's "Compensation Funds").

3.3.1.3   Purchasing

Purchasing refers to "the transfer of pooled resources to service providers on behalf of the population for which the funds were pooled" (Kutzin 2001). If the process of allocating resources is to pursue the objectives of equity and efficiency, there is a need to evaluate animal healthcare needs. Similar methods to capitation could be used in the animal health setting. Purchasing methods may vary from simple budgeting in highly integrated public systems, to a more complex scenario that would include the purchasing of different input, output or outcome units. In the latter example, the government would be collecting the revenue through general taxation, would allocate the resources to programmes and would contribute to staff and other costs. However, in many countries (and especially in developing countries), allocation of resources still depends on political negotiation or historical precedents (this applies also to other sectors). Other ways of purchasing, as for "managed care" type organisations (debated in section 3.4.4), may include the selection of specific units of inputs, outputs and outcomes.

Hence, the strategic design of purchasing lies in the questions of "what, how and from whom" services should be purchased (Murray and Frenk 2000). To purchase goods or services it is important to evaluate first the needs of the targeted farmer population. Once evaluated, the types of purchasing methods may vary also in relation to the existing market structure, as outlined in chapter 2. Purchasing methods could therefore go from direct purchase of interventions (such as vaccinations or surgical procedures), to purchasing more general services (such as services of veterinarians), or even to directly purchasing inputs like veterinarians, AHAs, vehicles etc. Key to this process is the choice of provider. Thus, contractual processes relating purchasers to providers, selection criteria of providers and payment methods need to be explicit.

When turning to structural arrangements, based on the reasons for market failure outlined in section 2.2.5, those likely to influence purchasing performance are the:

(i) Size and number of purchasers (e.g. farmers' associations in a specific district);

(ii) Choice and competition between purchasers (e.g. cooperatives, public veterinary services, NGOs etc.);

(iii) Transactions mechanisms between revenue pools and purchasers (e.g. a local branch of a cooperative in a private system, a regional fund in the case of a national system etc.);

(iv) Governance mechanisms of purchasers, as outlined by Williamson's definition earlier in this chapter.

At an implementation level, performance and efficiency will depend on the control and management of the quantity and quality of the services purchased. In the human health field these techniques are called "managed care" and will be explored in section 3.4.4 in relation to cooperatives and farmers' associations.

3.3.2 Provision

Provision of services refers to "the combination of inputs into a production process that takes place in a particular organisational setting and that leads to the delivery of a series of interventions" (Murray and Frenk 2000). Murray and Frenk separate the provision of human health services in two branches: personal and non-personal health services. It is argued here that such classification is related to the already debated degree of publicness of goods (in chapter 2). Indeed, the classification refers more precisely to Samuelson's rivalry and excludability principles outlined in section 2.3.1.1.

Following the underlying logic of the thesis, farmers or livestock keepers are considered as the end users of animal health services. Hence, *personal animal health services* would refer to services directly consumed by the farmer or livestock keeper, hence with a high degree of excludability and rivalry, whereas *non-personal animal health services* would apply for activities with a higher degree of publicness, such as public health education in the animal health and production field or to the environment as, for example, hygiene and sanitation. It is worth mentioning that these components also apply in the human health setting according to the broader definition of 'health action' outlined in section 2.2.2. This highlights, as previously mentioned, the intertwined nature of human and animal health and the difficulty, for the public health sector, of defining

roles and responsibilities for service provision and financing in relation to issues that also come under animal health.

Regarding strategic design, the way in which provision of personal AHS is organised has to do mainly with the market structure. An example in the AH setting are cooperatives or farmers' associations where there is vertical integration of different functions. The level of integration between provision and purchase functions may however vary. In relation to National Livestock Insurance systems (NLI) and/or National Animal Health Insurance Systems (NAHI), the way in which governments carry out these two functions lies at the core of the performance of the system. Although it will be debated later on in section 3.4.3, it is worth mentioning that National Livestock Insurance schemes embrace a broader concept than National Animal Health Insurance as livestock insurance may include not only animal health services, but also insurance in, for example, the case of compulsory slaughtering etc. Depending on the country studied, livestock insurance schemes may be separate from animal health schemes. However, for study purposes, the term NLI will be used for both animal health and livestock insurance. Some governments integrate the two functions (purchasing and provision) whereas others tend to use a purchaser-provider split model. This model exists when the provision of services is contracted by the purchaser, so the two functions are independent. The objective is thus to increase competition and lowering prices. The decision whether to use one model or the other relates to the level of decentralisation of the government and governance of provider institutions. Hence, the design chosen for the system might not only have repercussions in its performance, but also important policy implications. For example, a system where such integration between purchase and provision is integrated is India. Veterinarians and AHAs are still part of the

government structure, as well as the rural veterinary clinics. The choice of design is highly influenced by the political history and standpoint of the country. With such integration, little incentive exists for market forces to lower prices and/or increase quality of services provided.

For non-personal AHS (i.e. high degree of publicness), the conceptual framework for analysing the design would be the same. However, in most countries it is often the public sector that is in charge of these services. An interesting phenomenon in the AHS relates to zoonotic diseases and public health education. For example the WHO manual for community health workers' training and curricula rarely mentions how to prevent simple zoonotic diseases through, for example food handling (WHO 1987). In most instances there is no clear attribution of roles and responsibilities between the ministry of agriculture (MoA) and the ministry of health (MoH) (and in some cases the ministry of education (MoE)) for public health education relating to livestock and food safety. The recurrent outbreaks of *E. coli* 0157 represent an interesting illustration in this area. The same type of anomaly can be found between international organisations dealing with health and agriculture. Often lack of communication or misunderstanding leaves public health matters unattended.

This relates to the regulatory capture process outlined in section 2.2.5 and has been debated in the literature by Propper in the context of the UK NHS (Propper 1995). The regulatory capture phenomenon highlights an important strategic design problem also affecting structural arrangements and implementation management (see previous section 2.2.4). Hence, a crucial aspect in strategic design is the number and size of providers. This refers to the extent to which a single organisation provides a wide range of non-personal AHS or whether there

are multiple specialist organisations providing specific services such as hygiene and sanitation, (veterinary) public health education, environmental services, etc. As in the case of personal AHS, the degree of integration with purchasing in non-personal AHS is important, as well as the nature of governance and level of autonomy.

When focusing on structural arrangements for personal AHS at the level of provision, the relationship existing between provider organisations will be decisive for the delivery. The level of separation or networking of these entities (such as agrovet[8] and CAHWs, cooperatives etc) will determine access to facilities. Access might be direct (for example direct access to CAHWs, AHAs or veterinarians) or through referral (as for example in the CAH systems, access to the veterinarian through AHAs or CAHWs). The way in which access to services is organised points out the issue of cross referrals between public and private sector networks. This is of most importance when talking about privatisation of AHS (for example business oriented CAH systems and CAHWs duties of referring suspicion of epidemic diseases to government staff or veterinarians working in the public sector as well as the private sector) as inter-sector communication might be severely hindered or biased. This leads to non-personal AHS as the implications of such arrangements in the public sector relate to the staffing in the two categories. Hence, managers can be the same for both services or be different for each service. The public sector would tend to deliver some non-personal AHS such as prevention and (veterinary) public health education and promotion. But in private service delivery there may be no delivery of non-personal AHS.

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[8] Agrovet: veterinary pharmacy located in rural areas. The term is generally used in the East African context.

As for the HH sector, in the AH sector the formal and informal means by which each organisation arranges its tasks, control systems and authority relationship are important (Scott 1966). Following Murray and Frenk's (2000) rationale in the HH sector, in the AH context it could be suggested that whether top management of provider organisations is in the hands of veterinarians or of professional administrators is important. The issue of skill mix amongst various categories of providers (i.e. veterinarians, AHAs, CAHWs etc) at the clinical level is also likely to be a determinant of performance. This refers back to the discussion in sections 2.2.5 about transaction costs and moral hazard. Indeed, for example at community level CAHWs are supposed to reduce costs arising due to social distance. In addition, the debates in sections 3.2.2 and 5.4.1.1, point out that "trust" is a key element in selection of these workers as seen by villagers, who are the end users. Trust is a desired quality as it theoretically restricts the presence of providers' moral hazard, hence limits transaction costs.

3.3.3 Governance

As introduced in section 3.3.1.1, Williamson refers to governance as "the institutional framework within which the integrity of a transaction is decided. Markets and hierarchies are two of the main alternatives" (Williamson 1979). Quoting Macneil, Williamson (1979) uses his classification of contracts in order to explain the nature and occurrence of transaction costs. The tree types of categories of contract law mentioned are (i) classical, (ii) neoclassical, and (iii) relational.

First, characteristic of classical contract law is its attempt to "enhancing discreteness and intensifying 'presentiation', where presentiation has reference

to efforts 'to make or render present in place or time; to cause to be perceived or realized at present'[9]" (Williamson 1979). This refers to a situation where all contingencies involved in the transaction of a good or service are specifically described with respect to "likelihood and futurity" (Williamson 1979). The emphasis is therefore put on "legal rules, formal documents, and self-liquidating transactions" (Williamson 1979). This is the simplest form of transaction. However, it needs an established contractual environment, which is not always present in the animal health sector, especially in rural areas.

Second, neoclassical contract law applies to situations in the long-term which tend to imply a certain degree of uncertainty. In such cases 'presentiation' may become prohibitively costly (Williamson 1979). In these situations opportunistic behaviour is likely to arise from one or more of the parties implied. One solution proposed by Williamson to this situation is to internalise transactions through common ownership and hierarchy. This is illustrated by several examples outlined in section 3.4, where private insurance schemes for livestock an/or animal health have been burgeoning in several countries.

Finally, relational contracting derives from neoclassical contract law being spread over an increasingly longer period of time. The progressive increase in the "duration and complexity" of contracts has moved from a highly transaction-specific contract law to one in which the reference point is the relation itself developing through time (Williamson 1979). Relational contracting is therefore increasingly important in the relationship between purchase and provision. These lines of reasoning may be applied in the AH setting at different levels. For example, when focusing on community-based systems, due to the lack of

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[9] Quote of Macneil in Williamson (1979).

contractual framework in rural and remote areas between CAHWs and community members, transactions are based, as previously mentioned, on trust. Monitoring in these settings incurs high costs, deterring classical contractual agreements.

The privatisation process in most developing countries has generally weakened the previously frail overall system design. Consequently, governance has also been affected. As mentioned by Murray and Frenk (2000) in relation to the HHS and applicable to the AHS, a judicial structure which enforces contracts between purchasers and providers is of high importance for the effectiveness of the system. Attributes such as ethical codes of conduct or, as mentioned by Leonard (2000), the levels of corruption in the government are also likely to influence performance.

It is therefore essential for the system's design to consider activities such as performance assessment and priority setting. Performance assessment is crucial in providing strategic directions and assuring a level playing field to assess the performance of institutions involved in the revenue collection, purchasing, provision and resource development. Priority setting refers to selecting the criteria for prioritisation, and consensus building around these criteria, are major tasks for governance. These two factors imply both technical and political aspects. Inter-sector advocacy in relation to the promotion of policies enhancing animal and public health needs to be addressed in the strategic design. As mentioned earlier, AHS do not only deal with animal health and economic production of livestock products but also with a broader concept of protecting human health through (veterinary) public health policies, activities and education. Advocating progress on those determinants implies a cross-sector approach.

Governance is an important function in AHS performance that has usually been linked to the notion of regulation. Yet, a broader perspective on the involvement of governance in the overall system is taken in this study. Its key function is thus associated to setting, monitoring and implementing the rules for animal health systems. Associated with this is assuring a level playing field for all actors in the system, especially in relation to purchasers, providers and clients/farmers. Further, governance plays an important role in defining strategic directions for the whole AHS.

Regulation and consumer protection should also be considered in the design of the system. Regulation in the AHS would not only include sanitary regulation on livestock and derived products but should also include certain neglected areas such as the regulation of organisations in charge of the finance, provision and resource development functions of the system. Given the nature of animal healthcare markets and the presence of asymmetries of information between consumers (herders) and providers (veterinarians, AHAs etc), achieving a level playing field for the actors to enhance information exchange is also a role for governance.

3.3.4   Other influencing factors

Other aspects that are likely to influence AHS relate to the extent of integration of different sub-functions and non-financial resource generation.

3.3.4.1   Type of integration

It has been pointed out that AHS performance is closely linked to the different elements that form its structure. However, the relation between these functions

and sub-functions also influences its efficiency. Figure 6 (below) shows the diverse types of integration that exist in AHS. The degree in which animal healthcare services are integrated depends also on the level of decentralisation of activities in each country. Thus, in African as well as in Latin American countries vast differences can be found regarding decentralisation levels (Gimeno 2003; Sidibe 2003).
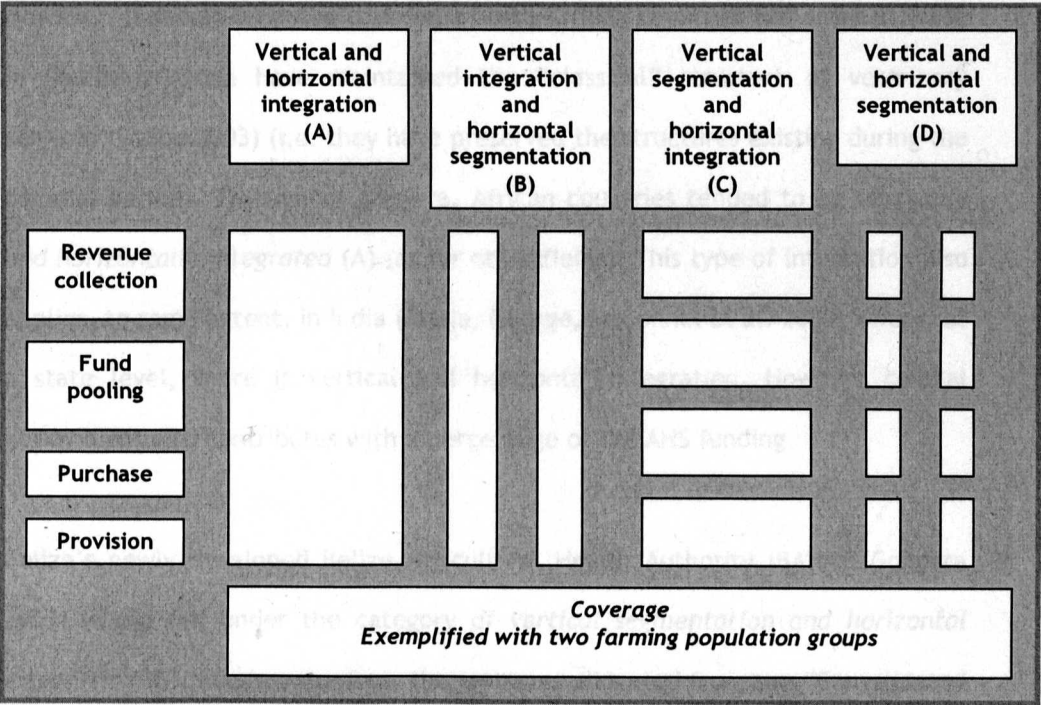
Figure 6: Types of integration in AHS (adapted from Murray and Frenk 2000)

In those African countries where privatisation has been undertaken, more than one entity is currently responsible for more than one function, thus falling into the category of *vertical and horizontal segmentation* (D). It has been recently pointed out by Sidibe that one of the problems of most francophone African countries after the privatisation process is the lack of articulation between the central administration and the delivery branches at district or local level. This phenomenon points out the usefulness of the transaction cost economics

perspective and the importance of governance (the latter is debated in detail in section 3.3.3). End users in remote areas often believe that they are being excluded from services (Sidibe 2003). Linked to this negative perception by stock owners is the lack of organisation and coordination by the central administration of field surveillance programmes, therefore hindering the system's performance.

However, it should be noted that some North African countries and some of those in Southern Africa have maintained the "classical" structure of veterinary services (Sidibe 2003) (i.e. they have preserved the structures existing during the colonial period). Throughout this era, African countries tended to be *vertically and horizontally integrated* **(A)** (as for other fields). This type of integration also applies, to some extent, in India (Ahuja, George, McConnel et al. 2000) where, at a state level, there is vertical and horizontal integration. However central government also contributes with a percentage of the AHS funding.

Belize's newly developed Belize Agricultural Health Authority (BAHA) (Gongora 2003) would fall under the category of *vertical segmentation and horizontal integration* **(C)**. Funds come from the revenues allocated from the "Consolidated Revolving Fund" (from the ministry of finance (MoF)), from fees imposed by the Authority and from donations (Belize 2000). All these funds are pooled to the Authority. Purchase and provision of services is separated as there is high involvement of the private sector for animal health services delivery (Gongora 2003).

An example that highlights *vertical integration and horizontal segmentation* **(B)** is Australia's national animal health structure (NAHS). Here, collection methods, fund pooling and purchasing are split between research and development and

animal health services. (This example will be further analysed in sections 3.4.2 and 3.4.3).

The extent of vertical integration especially affects functions such as revenue collection and purchasing, or purchasing and provision of services (Murray and Frenk 2000).

When analysing financing and revenue collection mechanisms at a governmental level, the degree of responsibility sharing (i.e. for public health and food safety) between ministries (e.g. MoA and MoH) creates an added difficulty for transparency and accountability in terms of funding mechanisms, as well as for service delivery. This sharing of responsibility delineates different AHS organisational patterns between developing and developed countries. Thus, in developed countries there is a tendency to move public health and food safety matters to the MoH (e.g. Japan (Ozawa, Chang, Yoshida et al. 2003), Italy (OIE 1994)) or to a separate authority (AFSSA[10] in France (Nairaud and Prunaux 2003) in 1998, FSA[11] in the UK in 2000 (UK-Government 2003), EFSA[12] as part of the EU in 2002 (European-Union 2003), the Canadian CFIA[13] in 1996 (Evans, Doering, Clarke et al. 2003)), whereas in developing countries these still lie under the MoA (or MoL). The split is mainly due to a higher degree of consumer awareness and consciousness of food related hazards in developed countries. By contrast,

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[10] AFSSA (Agence Française de Sécurité Sanitaire des Aliments) is the French Food Safety Authority and falls under the umbrella of the MoH, MoA and Ministry of Consumer Affairs. Detached bodies or agencies such as AFSSA do not have the mandate for sanitary policy (except for veterinary drugs). They play the role of control, alert and information dissemination and transparency (Nairaud, D. and O. Prunaux (2003). "La rénovation du dispositif francais d'analyse des risques sanitaires." Revue Scientifique et Technique 22(2): 433-447.

[11] FSA: Food Standards Agency.

[12] EFSA: European Food Safety Authority.

[13] CFIA: Canadian Food Inspection Agency.

developing countries tend to focus on increasing animal production; therefore AHS are principal activities and they remain under the MoA (or MoL).

3.3.4.2 Non-financial resources

Apart from the institutions that finance or provide services, crucial to the functioning of AHS (as well as for the HHS) are the organisations providing inputs to these services. Especially important are (i) human resources, (ii) physical resources (i.e. facilities and equipment) and (iii) knowledge (Murray and Frenk 2000). Examples will include universities and other educational institutions, research centres, and companies producing specific technologies such as pharmaceutical products, devices and equipment. Each sub-group's organisation is likely to influence the AHS performance as for example the degree of concentration of pharmaceutical companies and the level of competition. Another example could be the degree of autonomy of research institutions to set their goals and priorities. In terms of training institutions such as veterinary schools and animal health workers' training, the main issue would refer to whether they fall into the domain of the MoA or the MoE and the collaboration with the MoH. This will determine the match between supply and demand for animal health personnel.

Having analysed the key components of the organisation of AHS, the following section will focus on the different ways in which these services might be financed and the implications for their provision.

3.4   Practical approaches to funding AHS

As mentioned in the previous section, there are several ways in which services can be funded. These include taxation (TF), national livestock or animal health insurance contributions (NLI), private livestock (or animal health) insurance (PLI) and user charges or out-of-pocket payments (UC). Loans, grants and donations are also a way of funding animal health services. Such sources may contribute to funding mechanisms like taxation, national livestock or animal health insurance and private livestock or animal health insurance. Additionally, credit may also have consequences on livestock keepers' ability to pay for AH services. However, credit does not contribute to centrally funded AHS, but (as it affects ability-to-pay) its analysis will mostly lie under the umbrella of service provision and related "payment arrangements". This is why credit is not analysed in the thesis. The way in which AHS can be financed through the above mechanisms (or a combination of them) is analysed below.

3.4.1   The financing equation

Until recent years, national governments in developing countries have been in charge of animal health financing, taking care of all AHS expenses. However, as elaborated in section 1.1, during the past decades some governments have faced financial difficulties. Animal health services have been, at least partly, privatised. Herders now have to pay for the services of veterinarians or auxiliaries. Some farmers are grouped in cooperatives or integrated farms that help in obtaining a more cost-effective price per unit of veterinary service delivered. In other countries (as is the case in some Asian countries) it is possible to find national animal health insurance (NAHI) supplemented by a national livestock insurance system (NLI) (FAO 1992). India, for example, has a mix

between regional and central government funded AHS (Ahuja, George, McConnel et al. 2000). The ways in which revenues are collected vary widely between countries. In view of the upcoming challenges related to the "Livestock Revolution", most countries are pleading for an increase in animal healthcare services budgets (Gimeno 2003; Gongora 2003; Sidibe 2003). It is therefore surprising to see that, to date, there have been very few attempts to explore revenue collection mechanisms for the animal healthcare sector (see (Anteneh 1984).

By contrast, in the HH side, the debate regarding funding mechanisms started in the early 1960s (Abel-Smith 1963; Abel-Smith 1966) and is still continuing. Sources of financing have been thoroughly explored and their consequences, both positive and negative, evaluated. The financing debate in the HH field has therefore been much more elaborated and, consequently, is more sophisticated than that found in the AH field. For example, Abel-Smith (1992) has explored the options for funding health services in developing countries where it is generally difficult to raise more revenue through taxation. These are fee for services, community financing and compulsory health insurance (Stinson 1982; Akin, Birdsall and Ferranti 1987; Abel-Smith and Rawal 1992).

Still in the HH context, Evans (1998) formulated an equation for financing of healthcare systems (see figure 7). This equation was devised to render (human) health systems more transparent and accountable. It assumes that the total of all revenues has to be equal to all expenditure (Evans 1998). This in turn should be equal to the incomes plus the profits of those working in the system. Consequently the equation assumes no deficits. The equation states that: "revenue - the sum of taxation (TF), compulsory or social insurance contributions

(SI), out-of-pocket payments and user charges (UC), and voluntary or private insurance premiums (PI) - is equal to expenditure - the result of price (P) times the quantity (Q) of goods and services. These in turn, must be equal to the income of those who provide health care services - the quantity and mix of inputs (W) times the price of those inputs (Z)" (Mossialos, Dixon, Figueras et al. 2002).

TF + SI + UC + PI = Revenue	P * Q = Expenditure	W * Z Income of providers of healthcare

Figure 7: The financing equation (adapted from Evans 1998)

Even though the two systems (for animal and human health) are different, the concept of this equation still applies in the animal health setting. Some of the main inputs in the first part of the equation would definitely differ (as for example the weight of taxation and the counterpart in AH of "social insurance" contributions). But it does not mean that they do not exist. It is just more usual in post-privatisation developing countries to find systems commonly based on user charges or out-of-pocket payments (UC).

No system is based on a single source of revenue. Hence in the AH setting the mixed sources of revenue will come from taxation (TF), national livestock insurance (NLI) contributions, user charges (UC) and private livestock insurance (PLI). Examples will be provided in the following sections (3.4.2 to 3.4.5). In developing countries, though, non-governmental organisation (NGOs), intergovernmental organisations and international banks contribute significantly to this first part of the equation compared to the situation in the developed

world (Mossialos, Dixon, Figueras et al. 2002). This applies to both human and animal healthcare delivery.

3.4.2   Taxation

Taxation is one of the existing mechanisms to collect revenues for AHS (and evidently for HHS). What is explored in this chapter is the way in which AHS are or can be financed through taxation. Hence, it relates to an element that is part of a national taxation structure. Developed countries generally tend to have more reliable taxation systems than developing countries. In the latter case, lack of structures and enforcement tend to hinder the implementation and collection of taxes.

According to Musgrave and Musgrave (1989) and Cullis and Jones (1998), there are two basic principles to report the way in which taxes can be levied. These are the "benefit" principle and the "ability to pay" principle. The benefit principle argues that people who receive more than their share of public spending should pay more than their share of tax revenues. Benefit taxation is hindered by difficulties of measuring benefits, especially for goods with high externalities (Stiglitz 2000). The ability to pay principle is based on the concept of taking proportionally more from the rich than from the less well off. Some of the elements of taxation take into account benefit considerations. Yet, tax structure is generally planned to satisfy the "ability to pay" principle, the interpretation of which is not exempt from debate (Musgrave and Musgrave 1989; Cullis and Jones 1998).

Two different flow measures can be chosen as tax base (Musgrave and Musgrave 1989). These are (i) income (see Box 1 below) and consumption (expenditure),

and a single stock measure, (ii) wealth. Following Cullis and Jones (1998), a "personal expenditure tax" would be the equivalent to income-based taxes. They argue that such tax method is attractive because it takes into account individuals' consumption instead of their contribution (i.e. income). Hence, it would relate to "actual rather than possible consumption". It has been argued that this method of taxation would be more equitable than income tax. However, due to the administrative difficulties, it is not generally used. Yet, there is limited experience and evidence in relation to "personal expenditure taxation" (Cullis and Jones 1998). Wealth is the "discounted present value of the individual's net income stream", which is the stock value of flow. Hence, "if income is part of the ability to pay, then wealth is also part of it". In practical terms the difference lies in that "some things are more easily measured as a stock than as a flow" (Cullis and Jones 1998).

Direct taxation generally encompasses taxes on income, personal expenditure and wealth, whereas *indirect* taxation refers to taxes on sales of goods or services (Musgrave and Musgrave 1989). The implications of this distinction were put forward by Atkinson (Atkinson 1977).

Income can be categorised following the 'visible' and 'explicit' criteria (see table below). The elements in cell (a) are those "most easily documented and are typically subject to the tax system" (Cullis and Jones 1998). If tax rates vary in relation to the source of income, an incentive exists to find a form in which it will not be taxed. Hence, the system is encouraging "fringe benefits" (b) in remuneration packages as well as promoting the "cash economy".

	Marketed- explicit	Non-marketed- implicit
Visible	(a) Wages, salaries, rent, interests, profits (that may arise as a capital gain)	(b) Fringe benefits, e.g. company car, subsidised meals, private health insurance paid by the employer
Camouflage	(c) "Extra" work activities, jobs "on the side"	(d) Use of part of (e.g.) farmer's own output for domestic consumption

Situation in cell (d) is common in most developing countries with widespread subsistence farming. By definition subsistence farming generated income ('imputed' income) nearly equals total income. Yet, taxation process becomes easier with economic specialisation and trade (national and international), the existence of market prices and the recording of transactions. This is why it will be easier to find more visible and explicit taxation systems in developed than in developing countries (Cullis and Jones 1998).

Box 1: Income taxonomy (adapted from Cullis and Jones 1998)

There is, though, a wide gap between tax theory and practice (Musgrave 1959; Musgrave and Musgrave 1989; Cullis and Jones 1998). However, Adam Smith's principles for taxation still serve as guidance for any evaluation of such systems. These principles are (i) equity, (ii) certainty, (iii) convenience and (iv) economy or efficiency. Equity conveys the idea that individuals should contribute in proportion to their abilities, hence referring to the "fairness" in contribution as associated to individuals' earnings (Musgrave and Musgrave 1989). Certainty refers to visibility and compliance cost considerations (Cullis and Jones 1998). Convenience points out "the manner and timing for the tax payment should be convenient to the taxpayer" (i.e. acceptability) (Cullis and Jones 1998). Economy or efficiency refers to minimising excess burden or welfare costs. This also

includes the administrative, collection and psychic compliance costs of a taxation method (Musgrave and Musgrave 1989; Cullis and Jones 1998). Yet, putting these principles into an analytical and practical context is difficult. An added problem is that these principles may conflict with each other (Cullis and Jones 1998).

Although available data and examples are scarce in the AHS context, the next section introduces the debate surrounding the different ways in which taxes can be levied.

3.4.2.1   Direct and indirect taxes

Direct taxes may be levied on firms, households or individuals. Examples in the economic literature include personal income tax, corporate profit taxes and property taxes (Musgrave and Musgrave 1989). Personal income taxes tend to be labelled generally as progressive and redistribute income from rich to poor. This refers to a progressive tax system where tax rates are higher for those who have higher incomes. In developed countries, direct taxes are administratively simple to collect as formal records of earned income and of companies' profits are kept (Cullis and Jones 1998). Given that income is easily identifiable, it can be directly deducted from source, therefore increasing compliance (Musgrave and Musgrave 1989). If there is a high informal economy, it is important to apply institutional measures to reduce tax evasion (Mossialos, Dixon, Figueras et al. 2002) (although it might be argued that it is not an easy task). Such taxes are generally collected and pooled to the national treasury. Governments may allocate funds from this pool (which generally also includes indirect taxes) to AH programmes as happened in the UK during the FMD 2001 outbreak[14]. However,

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[14] Personal communication: Keith Sumption, FMD Officer (Europe Region), Animal Production and Health Department, UN-FAO. 2004: Rome

there are several institutional characteristics that might create horizontal inequity such as geographical variation of income tax rates, exemptions of taxation for certain incomes and tax deductible expenditure. Horizontal equity relates to the notion of 'equal treatment for equal needs' whereas vertical equity focuses on redistribution (Musgrave and Musgrave 1989).

In the AH field, *indirect taxes* are more common. These are levied on expenditure on goods and services as for example sales tax, value-added tax, excise tax and import and export tax (Musgrave and Musgrave 1989; Begg, Fischer and Dornbusch 2000; Stiglitz 2000). An advantage of this taxation method is highly visible and easily identifiable. Yet, they tend to be regressive as they are not related to overall income (Musgrave and Musgrave 1989). When taxes are regressive, people with lower income spend proportionately more of their saving on highly taxed goods such as tobacco than people with higher income. Even so, they are useful when there is a large informal economy and widespread evasion of direct taxes (Mossialos, Dixon, Figueras et al. 2002).

In developed countries, an interesting example of funding mechanism for one of the components of AHS is Australia's scheme for research support. This system relies mainly on *indirect taxation* (which is earmarked for R&D). Levies and charges are therefore used to fund activities such as research and development, marketing and promotion, residue testing, and animal health programmes (Government-of-Australia 2003). Collection of taxes is supported and enabled by government legislation (Holden 1999).

The Levies Revenue Service (LRS) of the Department of Agriculture, Fisheries and Forestry – Australia (AFFA) collects and administers most levies. These are usually

collected at the first point of sale of the primary producer or point of further processing. In cases where there are specific difficulties in collecting levies at the first point of sale, a levy on inputs may be considered. Examples of levies for the livestock and dairy sectors include the following[15] (Government-of-Australia 2003):

(i) Livestock levies: buffalo export, buffalo slaughter, cattle and livestock export charge, annual cattle and livestock transaction levy, monthly cattle and livestock transaction levy, chickens-laying charge, chickens-meat levy, deer export, deer slaughter, etc.

(ii) Dairy levies: dairy ("All Milk Levy"), dairy adjustment levy, etc.

All levies and charges are paid into the Consolidated Revenue Fund (CRF). The Federal Government assists primary industries by matching certain R&D expenditure up to the limit of the levy receipts, but subject to a further limit in any financial year of 0.5 percent of the gross value of production. Thus, *direct taxes* also contribute to the CRF, and hence to R&D activities, through Federal Government. This matching of expenditure provides additional revenue for primary industry R&D.

The LRS then allocates the funds of the CRF into the appropriate Research and Development Corporations (RDC), which are in charge of R&D activities. These Research and Development Corporations include Animal Health Australia (to be discussed in section 3.4.3), Australian Pork Limited, Meat and Livestock Australia and others. As an example, RDC invested around 364 million Australian Dollars in

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[15] Specific description and details on each of the taxes may be found at: http://www.affa.gov.au/content/levies.cfm

R&D during the period 2000-2001. Investment in R&D by industry and Government, not only results in industry-based productivity increases, but also delivers essential public good outcomes. These include regional development, improvements in food safety, environmental benefits, medical advances and new consumer products (Government-of-Australia 2003).

In developing countries, Anteneh (1984) pointed out some *indirect taxation* mechanisms used, although not generally earmarked, for AHS funding. He explored the different types of taxes, charges and levies that were applied in 14 West African countries. The taxes recorded were (i) import/export taxes on live animals, meat and edible offals; (ii) trade licences; (iii) livestock head tax[16]; (iv) meat inspection fee; (v) slaughter fee; (vi) market fee; (vii) holding ground fee; (viii) transit fee; (ix) sanitary tax/veterinary certificate. The data obtained dated back to 1975, a period well before the privatisation process. It was shown that taxes such as trade and slaughter fees were the most constant across countries. The reason lies in that these taxes are generally easier to administer and encounter less political rejection as they are not directly confronted to livestock owners (as opposed to direct taxes). This may though be arguable for some of the indirect taxes. However, such taxes are more likely to be included in the national or regional treasury than being earmarked for livestock services (debate over earmarked versus general taxes will follow in section 3.4.2.3). Hence, the actual livestock budget may seem to be smaller than the potential one. Of course this depends on the weight of livestock related activities in the country studied. These taxes were pointed out by Anteneh as a possible source of revenue that could be collected to increase the livestock budget in countries where the sector plays an important role in the economy (Anteneh 1984).

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[16] Although this tax was later abolished in several of the countries studied.

Following these lines data obtained from Senegal also indicates that indirect taxes tend to be the preferred method of taxation (annex 1). Following the questionnaire's results, these include taxes at the abattoir paid directly by the farmer when slaughtering the animal, movement control, sanitary tax, commercial licence tax and taxes paid by the abattoir itself on a yearly basis (through "timbres fiscaux"). Hence, the taxes currently implemented in Senegal are still similar to those pointed out by Anteneh. Nevertheless, some of these taxes may be national or local.

3.4.2.2   National and local taxes

Following Musgrave's theory of public finance, *national taxes* are useful because they allow trade-offs to be made between AHS and other public policies. Through this revenue collection mechanism the state obtains a yearly amount of money that the MoF then allocates to other ministries in relation to the needs of the period and negotiating power of each ministry.

For example, in Bangladesh the bulk of animal health protection and treatment falls under the responsibility of the government through the Directorate of Livestock Services (DLS). AHS are executed through a network of 9 regional diagnostic laboratories, 17 district diagnostic laboratories, one Veterinary Vaccine Production Laboratory (VVPL) and 464 Upazila Veterinary Hospitals (UVH). However, no data is available on how the national animal health services in Bangladesh are funded (types of taxes or existence of a separate fund). Presumably funds come from taxation (local and/or general) therefore there is no separate fund-pool. It is worth pointing out that, in spite of an allocation of

TK 50.0 million intended for free distribution of medicines and de-worming drugs to poor farmers, disease diagnosis and treatment of ruminants carried out by the DLS staff are not cost-free (Jahan and Rahman 2003).

An advantage of collective taxes (i.e. national taxes) is that it enhances economies in administration. Devolving revenue collection to regions produces fewer economies of scale and thus higher costs. In the developing world, countries such as Chad and Mauritania tend to channel their whole AHS budget through the central treasury (Anteneh 1984). Examples obtained from the questionnaire performed in Senegal include commercial licence tax (which amounts 15000 FCFA per year), sanitary tax and those taxes paid by the abattoir. The latter include the stabulation tax for ruminants, holding tax, stabulation tax and "ressuyage" tax.

Local taxes, however, might be an attractive alternative to national taxation for four reasons. First, local taxes are seen as more transparent (i.e. visibility) because the relationship between the amount of money levied through local taxes and the amount spent on animal health services may seem to be more direct. This has been highlighted previously in Anteneh's example. In countries such as Mali, Niger, Senegal and The Gambia, in addition to central government budgets, finance is channelled through regional (district) administrations, which raise funds through different local taxes and levies including those on livestock (Anteneh 1984). As seen in the Senegal questionnaire, taxes that remain local refer mainly to movement control/restriction taxes and amount 100 FCFA per head. Second, local taxes tend to improve accountability as local politicians are closer to the electorate and decisions on how to spend the money are (supposed to be) more apparent. This is especially relevant in countries where livestock

plays an important role in the local (and national) economy. Third, theoretically, they enhance responsiveness to local preferences so that people's needs guide the decisions taken. Fourth, local taxes have the advantage of giving importance locally to issues that are not necessarily a priority in the national budget (i.e. in the political negotiation of budget allocation by the MoF). Hence, at a local level and in relation to the characteristics of the region, animal health expenditure might be given higher priority than at a national level (this would apply differently in developed and developing countries. Developed countries would give priority to food safety whereas in developing countries, where animals and derived products tend to play a major role in the local economy, AHS would be considered more important).

However, depending on the importance given to animal health and/or food safety, local taxation might create political inertia. Issues of horizontal inequity might also arise not only if local taxes differ between regions but also if the tax applied in all regions is the same. Local taxation can be as progressive or regressive as national taxation, however the scope will be more limited and it has the potential to redistribute income only within a region (as opposed to the whole population).

3.4.2.3   *General and hypothecated taxation*

General taxation has two main advantages. First, taxes are obtained from a broad base and diverse sources. Second, it allows trade-offs between animal health care and other areas of public spending which might reflect the priorities of the population. However as previously mentioned (in section 3.2.1), the

allocation of the budget for animal health services in the general taxation system is subject to annual negotiations.

Hypothecated taxation refers to taxes that are earmarked (in the context of this study, for animal health). They might be direct or indirect (Musgrave and Musgrave 1989). This revenue collection process may be considered to have several advantages over general taxation for three reasons. First, it renders the process more transparent and possibly less susceptible to political pressures (as taxes are earmarked). Second, it reduces resistance to taxation because its purpose is more visible. A third possible advantage is that "people feel more connected to the tax system, which in turn, may increase the pressure on providers to improve quality" (Mossialos, Dixon, Figueras et al. 2002). However, disadvantages of this system also arise.

In practice not all hypothecated taxes are practically earmarked. As mentioned by Anteneh (Anteneh 1984), the livestock tax revenue may be merged with other taxes. Following the results of the questionnaire in Senegal those taxes earmarked for animal health are those paid for by the farmer at the abattoir. In the specific case of Senegal where the questionnaire was performed, these taxes are "taxe de stabulation, abattage, ressuyage, stockage" and "timbre fiscal" (see annex 1). Therefore the above-mentioned "connection" between the population and the tax system is undermined. Furthermore, this method might increase rigidity in the budgetary system as expenditure depends on the revenues collected (limited budget) and not on political decisions. Finally, some interest groups and professional lobbies might take advantage of the hypothecation systems to exert pressures over the funds. In fact, some compulsory insurance contributions are a payroll or earmarked tax collected by the government.

3.4.3 National insurance for livestock and animal health services (NI)

In the human health field, social health insurance (SHI) contributions are earmarked for health. This exists in countries such as France, but not in others like the UK. Their main characteristics are that taxes are mandatory, collected by a separate fund closely linked to the government (otherwise it would be an earmarked payroll tax. Contributions are usually related to income and not to risk (Normand and Busse 2002). In the human health care field, Abel-Smith developed a comprehensive historical review of the origins of insurance schemes in European countries (Abel-Smith 1992).

In the livestock and animal healthcare field, earmarked contributions also exist and some similarities can be drawn from SHI schemes. However, attention should be drawn to the different focus that national insurance schemes in the livestock sector may take. These schemes may include compensation funds for losses due to particular diseases and/or animal health services needed to prevent or contain such diseases. Therefore, for simplicity in study purposes, national insurance schemes in the livestock sector will be conveniently divided into National Livestock Insurance (NLI) and National Animal Health Insurance (NAHI). The concept of NLI is wider than that of NAHI. The latter is restricted exclusively to animal health. Funding mechanisms will vary in relation to the organisation and type of scheme.

3.4.3.1 National livestock insurance (NLI) contributions

Livestock insurance in intensive production systems is widely used in European countries (Van Asseldonk, Meuwissen, Huirne et al. 2003). In these systems, two types of compensation funds exist: compensation for direct losses and

compensation for consequential losses. Public intervention varies between countries and in relation to the elements for which compensation is paid.

3.4.3.1.1   Direct losses

Compensation of direct losses in Europe is partly based on European Union (EU) directives[17] for list-A diseases. Direct losses include the value of the animal destroyed, welfare control measures and organisational aspects (e.g. monitoring of farms in restriction zones). Compensation includes 50% of the value of animals subject to compulsory and pre-emptive slaughter, 70% of the value of those slaughtered for welfare reasons and 50% of the costs of organisation (i.e. administrative). The rest of the costs may be (i) refunded from national budgets, (ii) co-financed through public-private financing schemes where farmers pay a compulsory levy or (iii) suffered by the producer.

(i) Countries where governments fund compensation for direct losses from their national budgets include Sweden, Finland, Denmark and the UK. The main welfare control measure for the UK FMD outbreak in 2001 was to slaughter animals thought to be suffering as a result of movement controls. Producers were compensated for their value. However, this policy will not be continued. In future outbreaks such compensation will not be paid[18];

(ii) Those countries that opted for public-private partnerships are Austria, Belgium, The Netherlands, Greece and, as previously mentioned, Germany. In this case, the arrangement generally includes a compulsory or voluntary levy, paid by farmers to a separate fund. In Belgium, for example, types of levies are

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[17] Council directive 90/424/EEC http://www.warmwell.com/90424eec.html
[18] M. Upton, Professor Emeritus, University of Reading, personal communication 2003.

differentiated in relation to the animal species and farm size. Additionally, levies for pig production vary depending upon whether the production system is open or closed. These levies are collected in a fund managed by the Ministry of Agriculture. Services delivered through these funds include some animal health and quality improvement measures. However, the collection method varies between countries. Hence, Greece, which has a NLI programme under the Greek Agricultural Insurance Organisation (ELGA), defines the compulsory fee as 0.5% of the value of the stock production sold;

(iii) Farmers in Spain and Italy do not receive any compensation from their respective governments other than for destroyed animals. There is no voluntary or compulsory levy.

3.4.3.1.2   *Consequential losses*

In Europe, options do also exist to compensate for consequential losses. These losses refer to business interruption, losses related to the established restriction zones, additional repopulation costs, losses from emergency vaccination and price effects. The options are mainly: (i) private insurance schemes, (ii) free public disaster assistance, (iii) public-private partnerships.

(i) Private insurance schemes in Europe exist for certain types of livestock (mainly cattle and sheep). Examples of countries having such schemes include the UK, The Netherlands and Germany. In Italy private insurance schemes are exclusively for dairy production and sheep but participation is very limited.

(ii) Free public disaster assistance exists in Finland and France. Although funds are public, private insurers administer the scheme. Private insurers receive a

commission but do not incur any loss. There is therefore no risk transfer to such insurers;

(iii) Finally, public-private partnerships for the compensation of consequential losses exist in Denmark, Finland (to some extent) and Spain (through a structure co-financed by the government named Agroseguro). Under this type of partnership, the government may act as an insurer or re-insurer. Under these schemes the risk of losing financial resources is transferred to the private insurers, as opposed to the retailing mechanism under free public assistance.

Through this overview of compensation mechanisms in Europe, it can be seen that government or public intervention still remains high, as the extent of negative externalities stemming from the occurrence of OIE list-A diseases is likely to be high. Private livestock insurance involvement seems however to be increasing in Europe for consequential losses (Van Asseldonk, Meuwissen, Huirne et al. 2003).

In a developed country setting, private sector intervention is interesting as it transfers risk (i.e. cost of disaster) away from public funds. However, in developing countries, the weak legal framework and institutional context, as well as the lack of private providers of livestock insurance, make public intervention the only alternative available.

Livestock insurance for farmers exists in Asian countries. Nevertheless, specific and comprehensive data on how such services are financed and organised is lacking. In India, as part of the national insurance scheme (General Insurance Company - GIC), livestock insurance is automatically granted to poor dairy

farmers when buying an animal from a specific source. By introducing a master policy, all animals financed by bank loans were automatically covered by the insurance. A low cost insurance cover at a premium rate of 2.25% was introduced for animals subsidised by special development programmes (i.e. Integrated Rural Development Programme (IRDP), Small Farmer Developing Agency (SFDA), Marginal Farmer and Agricultural Labourer (MFAL) and Drought-Prone Area Programme (DPAP) projects). The scheme reimburses the owner in case of animal death (FAO 1992). GIC in India will compensate only under the following conditions: accident, diseases contracted under the period of the policy, surgical operations, and riot and strike. The policy may be extended to a Permanent Total Disablement (PDT) on payment of an extra premium and will therefore cover the event of dairy cows not conceiving and not producing milk, or stud bulls incapacitated for breeding purposes (Mathema and Joshi 2000).

It is worth highlighting the entangled nature of livestock insurance and animal health services. In India, the latter services fall under the responsibility of state governments (although central government also plays an important role and some privatisation has already been undertaken), and is managed separately from the national livestock insurance. In 1991, the Department of Animal Husbandry and Dairying (DAHD) was created in the MoA (central government). The DAHD primarily concentrates its activities on supplementing and complementing the efforts of state governments in enhancing productivity levels of livestock. Hence, one of the components relates to the provision of animal healthcare services. Funds for the provision of these services come from two sources: (i) the central government and (ii) each state's regional fund. However no data is available on the fund collection mechanisms for either of the two fund-pools. Given that the Indian public sector tends to be highly centralised and hierarchical, here it has

been extrapolated that the origin is likely to be general taxation (for both, central and regional levels) although some user-charges have been introduced in India in 1996 for (the previously free) AHS, which might contribute to the regional pools. Regional funds are the ones bearing the biggest part of the animal health budget. For example, in Gujarat during the period 1996-1997, the state government share provided to AH was 61%, whereas the central government share was 39% (Ahuja, George, McConnel et al. 2000). Nonetheless, GIC has "employed a number of veterinary officers who have been provided with kits for treating animals during their rounds. Their services can be utilised by various agencies, whenever necessary, in the overall national interest" (FAO 1992). It is however stressed that "veterinary services should be provided free or at a cheap and affordable cost and government line agencies have to fully cooperate [with GIC]" (FAO 1992). Hence, livestock insurance and health care are supposed to be complementary, thereby highlighting the intertwined nature of AHS and livestock insurance.

Similar livestock insurance schemes exist in other Asian countries such as Nepal, Thailand, Sri Lanka, Indonesia, Malaysia and Philippines (Mathema and Joshi 2000). These schemes started during the 1970-80s and were initially focused on dairy production, but they expanded later on to include other livestock. Strong links with banks (generally national and a few commercial) have been created. For example, when farmers ask for a loan or credit from the bank, the adoption of an insurance policy is obligatory. Insurance premiums vary between 3 to 5% of the value of the animal. Premiums are generally kept in a para-statal fund. The funds collected serve to reimburse the farmer when the insurance policy refunds in the stipulated cases. Yet it is commonly stated in the insurance policy

documents that no compensation for compulsory or emergency slaughtering (i.e. direct losses) is reimbursed by the national insurance company.

NLI embraces a wider concept of insurance of income maintenance and may or may not include animal health. Livestock insurance and animal health insurance are, as seen in these examples, highly entangled. However, schemes may exist at a national level focusing more specifically on the animal health service component.

3.4.3.2 National animal health insurance (NAHI) contributions

The origins of NAHI contributions go back to the beginning of the 20th century in Germany when the Bismarkian model of SHI started. The "Bismark" model has often been considered the standard model of social insurance in the human health field. Compulsory health insurance started in Germany in 1883 (Zollner, Kohler and Zacher 1982) and "the ideology of social health insurance developed: people paid according to what they earned and the basic health needs of the earner and the family were met – whatever the risk and the family size" (Abel-Smith 1992). As an example, in the former Federal Republic of Germany "75% of the population were insured compulsorily, about 13% voluntarily [...] and 10% privately" (McPake, Kumaranayake and Normand 2002). However, two other types of models of human health systems have been devised: (i) the "Semasko" model characteristic of the former Soviet Union, representing the most "pure" public model (at least in theory as there were substantial 'under-the-counter' payments) in that it is publicly funded and provided, and (ii) the British model, which is largely publicly financed, and provided through the National Health

Services (NHS). Nevertheless the British model includes some forms of user-charges and a small private insurance sector outside the NHS.

Abel-Smith pointed out in the HH field that the "organisational pattern of insurance funds differs according to their historical evolution and political culture" (Abel-Smith 1992). Indeed, he described the following possibilities:

(iii)   "One insurance fund covering all the insured, though powers may be delegated to local areas". This simplifies administration when there are employment changes;

(iv)   "A series of local funds to bring control nearer to the consumer. Cross-subsidies may be needed between richer and poorer areas";

(v)   A system of insurance "largely based on industry" as in Germany, South Korea and Japan. "Under the law, all the funds have to provide certain defined benefits: some other benefits may be optional";

(vi)   "To have competition between funds for members, with a central body collecting the contributions and distributing them among the chosen insurers according to the risk of their members", as it has been the case in the Netherlands.

In the AH field, Germany passed a national law on contagious livestock diseases enabling the establishment of "Compensation Funds" (TSK) in 1909 (Donhauser and Pauels 1997). These collected funds to support official measures against contagious diseases. TSKs were then established in the German federal states. The philosophy of the TSKs relied on the combination of the livestock owners' will of risk-sharing with the state support for agriculture. It was introduced as a compulsory scheme and the intention was to accumulate funds to compensate

farmers for losses incurred from the application of official measures. Those measures were (i) the control and fight of contagious livestock diseases and (ii) the application of prophylactic or preventive measures (prevent the outbreak and spread of diseases), which constituted the biggest bulk of the financing. Nowadays, TSKs exist in all federal states as para-statal self-governing institutions and their mandate is determined in the statutes. It is an independent management body that takes decisions according to best practice (Donhauser and Pauels 1997).

Financing of (or contributions made to) TSKs come from three different sources. First, membership is compulsory for all livestock holders and the annual fee is related to the number of cattle, horses, pigs, sheep and poultry owned. Second, TSK receives state grants to finance legally ordered activities such as vaccinations and routine tests. And third, another source of income is revenue coming from financial investments and assets held (Donhauser and Pauels 1997). Compensations received by livestock owners from TSK relate to the following situations (Donhauser and Pauels 1997):

(i) Losses due to notifiable diseases,

(ii) Losses due to compulsory measures for disease prevention and control,

(iii)TSKs contribute partly to the costs incurred by proper disposal of rendering carcasses in rendering plants, and

(iv)TSKs compensate mass vaccination and laboratory testing expenses.

The eradication of the major contagious diseases (such as FMD, bovine tuberculosis, cattle and sheep brucellosis and cattle leucosis) in the 1950s in Germany has been largely attributed to the TSK.

TSKs operate under the guidance of the federal MoA or MoH (in relation to each federal state). At the top of its structure is the supervisory board composed of representatives of livestock holders, private veterinarians, public veterinary officers and the supervising ministry. It is the supervisory board which sets the guidelines and relevant decisions applied by the management on day to day operations (Donhauser and Pauels 1997).

The newly created Animal Health Australia embodies a similar structure to that outlined above for Germany. Animal Health Australia was founded in February 2000 as a result of a consultation between government and industry groups regarding strategic planning for policy and funding mechanisms for a national livestock system programme. The Australian National Animal Health System (NAHS) is organised as a not-for-profit company which currently includes 24 members spread across four membership categories: (i) the Commonwealth, (ii) State and Territory governments, (iii) key primary industry groups and (iv) other key interested organisations.

Funding is provided via annual subscriptions paid by the members to the Company and "is applied in pursuit of an integrated national animal health system" (Animal-Health-Australia 2003). Subscriptions to Animal Health Australia are determined on a three-year rolling average of the Gross Value of Production (GVP) as established by figures published by the Australian Bureau of Statistics. Each livestock sector or species is represented by an organization that is effectively the "peak body" for livestock producers utilizing that species of animal. The Commonwealth (Federal) government is also a member, as are the seven States and Territories. The Commonwealth pays one-third of the total

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subscription funding due (based on break even expenditure budgets prepared in advance and approved by members of the Company in general meeting), the States and Territories pay one-third (split between them all on the basis of GVP as noted above), and the "peak bodies" pay one-third, also split between them as per their relative GVP figures[19].

The structure is supported and enabled by legislation. The Company also has the capability to manage national animal health related programmes for all, or a subset of its members. Programmes that have a collective benefit for members are funded from members' subscriptions. The Company currently has three major subscription-funded programmes addressing (Animal-Health-Australia 2003):

(i) Animal health services, "which aims to improve the national capability, standards and performance of Australia's animal health system",

(ii) Animal disease surveillance, "which provides a nationally integrated, innovative surveillance system to underpin trade", and

(iii) Emergency animal disease preparedness, "which enhances management approaches to deal with animal disease emergencies".

Animal Health Australia also includes disease specific programmes. Those diseases of interest to a limited number of members are therefore funded directly by the primary beneficiaries. In 2003, the Company managed 'special' programmes and projects such as Tuberculosis Freedom Assurance Programme (TFAP), National Transmissible Spongiform Bovine Encephalopathy Surveillance Programme and the National Arbovirus Monitoring Programme.

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[19] Willoughby, Animal Health Australia's Finance Officer, personal communication 2003

Similar examples of disease targeted specific programmes can be found in the UK, but also in developing countries, as for example, in Côte d'Ivoire. After the outbreak of Aujezsky's disease in 1981, the British government offered help by partially compensating the eradication of the disease. The British pig industry's first answer was to refuse this offer. However, after weighing the costs and benefits, in 1983 an agreement was reached between the British government and the pig producers to control the disease. A Pig Disease Eradication Fund (PDEF) was created to coordinate the financing and control of the disease. A levy of 0.3 GBP per head was raised on all pigs destined for slaughter or export. This levy covered the compensation costs incurred through the compulsory slaughter of animals. There was a fund in charge of the collection of the money: the Meat and Livestock Commission acting under the Pig Industry Levy Act of 1983 and transferred to the PDEF Ltd for compensatory payments to producers with affected herds. This tax collection raised an amount of 27 million GBP. All other costs associated with the scheme were borne by the government that includes administrative, veterinary and laboratory resources (Holden 1999). In Côte d'Ivoire, specific funds for disease eradication or containment exist. In the case of compulsory control and eradication of CBPP, Rinderpest and PPR, funding sources from 1994 to 2002 came from: (i) the government through the "Budget Special d'Investissement et d'Equipement" (BSIE), (ii) livestock keepers' direct contributions and (iii) external funding (European Development Funds). Livestock keepers contribute through payment of charges for services, which are collected by the external services of the ministry in charge of animal production and subsequently pooled to the "Caisse Autonome d'Amortissement" (CAA, state bank). Management of these funds is centralised at the livestock and animal health project level, which falls under the direction of the ministry in charge of

animal production. Management of these projects is also supported by the decentralised governmental structures (Vame 2003).

3.4.3.3   Advantages of NI schemes for the livestock sector

These examples show the diverse and mixed nature of funding mechanisms for livestock insurance.

The pattern observed from the above examples is similar to that found in the human health counterpart, as stated by Abel-Smith (1992). The main particularity of a 'national health system', which is the existence of a separated collector agent, is therefore also found in the livestock setting. The collector agent in the AH field can therefore be a single NI fund (such as in Belize) or several funds devolved to the regions (e.g. Germany, Australia, India). The predominant attraction of NI (whether central or regional) is the 'independence' of the insurer from government and the perceived greater responsiveness to the consumer (i.e. farmer). However, the 'independent' NLI fund is at arms' length from the government, therefore it may still be subject to a certain degree of manipulation, although less than that of the general taxation fund. It is however easy to see that due to problems of governance, accountability and regulation of funds, these might fall again under the control of the MoA or MoF.

NI, as a way of collecting revenues, has similar advantages to those outlined for hypothecated taxation (see section 3.4.2.3). It is more transparent and usually more acceptable. Theoretically, NI funds are supposed to be better protected (than if they were managed by the ministry) from political interference since budgetary and spending decisions are devolved to independent bodies. However,

independent agencies might also be vulnerable to political influence or pressure, a process known as "regulatory capture" (Stigler and Fiedland 1962) (mentioned earlier in section 2.2.4).

Additionally, the risk pool created through NI is much larger than that obtained through private insurance, especially in developing countries. However, depending on the nature of the contributions to the NI fund/s, difficulties may arise when trying to obtain a census of farmers as they might produce in the informal market. An illustration is the recent AI outbreak in Vietnam (Riviere-Cinnamond 2005), where identifying and recording the actual number and breeds of animals farmers possess (FAO 1992) or in determining the gross value of production (GVP) was not always possible. This might limit access to certain parts of the farmer/producer population, especially for poor farmers and small producers and this highlights some of the equity problems arising from NI.

Other key points in the functioning of NI are associated with the specific organisational arrangements of the insurer's fund(s) (i.e. single or multiple funds). These arrangements might have an important impact on the system's efficiency. Hence, a single fund may reduce administrative costs, ease regulation and obtain bigger risk pooling. Multiple funds may or may not compete with each other. If they compete, there might be an incentive for improving efficiency. Yet, insured farmers will not be able to choose. This may lead to some lack of responsiveness and certain degree of inefficiency. Defining the extent of coverage for non-competing funds in relation to the region or to a specific disease might also be essential. For example, regional funds exist in Germany. They are geographically distinct and cover the entire farmer population of the territory. This allows for larger pools, spreading administrative costs and

functions over a larger base. However, they can also have the disadvantages of local taxation regarding regional inequity of wealth, income and risk status.

Schemes targeted at specific diseases are not generally compulsory. Commonly, it is a collective decision of the farmers/producers affected by the disease to organise such schemes themselves (e.g. Animal Health Australia's special programmes outlined in section 3.4.3.2). The underlying rationale is usually based on the economic implication related to the presence of the disease for both, producers and government. Such specific funds are generally non-competing and targeted to a defined population. Under such funds, services are tailored to meet the needs of farmers/producers. Contribution rates might though be higher than average, especially for highly intensive farming. In rural areas this may raise some equity considerations. Another possible disadvantage of disease targeted schemes is that coverage might serve overlapping geographical areas, therefore duplicating administrative costs and limiting the total size of the pool.

Some of the characteristics outlined for disease-targeted schemes relate to those found in private livestock insurance.

3.4.4   Private insurance for livestock and animal health services (PLI)

According to Stiglitz the main difference between private and social insurance is that with private insurance "there is a close relationship between the payment of the individual, the risk he faces and what he receives" (Stiglitz 2000). Indeed, as

stated by Musgrave and Musgrave, "social insurance programs provide insurance *and* redistribute income" (Musgrave and Musgrave 1989).

When turning into the human health sector, Abel-Smith debated why national coverage through private health insurance would be costly and not equitable (Abel-Smith 1992). As mentioned earlier, human and animal health systems do not convey the same ethical values. This is why it might seem logical to find more often private insurance in the animal health sector. Nevertheless, following the 'health action' concept (see 2.2.2), there are overlapping areas between both sectors.

Insurance principles and their implications have been analysed in the context of human health by several authors (e.g. Abel-Smith 1992; Abel-Smith and Rawal 1994; Green 1999; Mossialos and Thomson 2002). In the specific context of private insurance, Mossialos and Thomson (2002) present a useful categorisation, which may be applied in the context of AH. Indeed, before entering in the categorisation of private schemes, it is important to bear in mind the debate in section 2.2.5 regarding market failures and the presence of incomplete market (Stiglitz 2000).

The concept of private insurance for the livestock sector includes all those initiatives that are individually or collectively organised without government involvement or intervention. Private insurance exists in the livestock sector and may be structured and financed through (i) farmers' associations, cooperatives (Umali-Deininger, Feder and deHaan 1992), (ii) community-based initiatives, (iii) mutual livestock insurance groups or (iv) insurance companies (Donhauser and Pauels 1997; Van Asseldonk, Meuwissen, Huirne et al. 2003).

These schemes can play a valuable role in the financing, provision and delivery of a wide range of toll good services varying from preventive to curative, drug distribution or even ordinary animal diseases not covered by the national livestock/animal health insurance (if existing) and other hazards. Toll good services have been defined in section 2.3.1. Briefly, these are those for which after paying an initial fee, consumption of the good or service is unlimited, up to capacity maximums. Such types of PLI are largely related to high value productions like dairy, pig or poultry, the organisation of which relates to Buchanan's 'theory of clubs' outlined in section 2.3.1.3.

However, data regarding such schemes is difficult to obtain. Here, examples were obtained through a through literature review in AGRIS and AGRICOLA databases, as well as examples obtained from the grey literature and through FAO and AU staff members. In developed countries, and especially in Europe as mentioned in the previous section, PLI is increasingly being managed through insurance companies (Van Asseldonk, Meuwissen, Huirne et al. 2003). Examples of PLI mainly focusing on AHS include Israel's HACHAKLAIT (Efron 1997), which started as early as 1919, New Zealand's "Veterinary clubs" (FAO 1997; Smith 2001) created in 1930 from associations of private livestock owners, service cooperatives in Ethiopia (deHaan and Bekure 1991), which started in 1975, and Kenya's cooperative societies (deHaan and Bekure 1991; Chema, Oruko and Heffernan 2001; Smith 2001), which have been evolving since 1988. Similar structures exist in other countries such as in the state of Gujarat in India. There the Amul Cooperative and the Kheda and Mahesana district cooperative unions are among the most active and are operating relatively well-managed insurance delivery systems (Ahuja, George, McConnel et al. 2000). In Latin America, similar

schemes may also be found such as the AGSO (Asociacion de Ganaderos de la Sierra y Oriente), which started in 1995 (Kleemann 1999).

Thus, according to Mossialos and Thomson (2002), insurance in the human health sector may be classified in three categories: (i) substitutive, (ii) supplementary (or choice-increasing), and (iii) complementary. Given the similarities existing between the human and animal health sectors, outlined in section 2.2.1, such categorisation may also be applied to the sector of private livestock insurance. The boundaries of each of these categories of PLI are not always clearly defined; therefore overlap is expected when revising PLI schemes in different countries. Nonetheless, such classification is useful for the purposes of the thesis.

3.4.4.1   Substitutive insurance

Substitutive private livestock insurance may exist as an alternative to the national animal health and/or livestock scheme applied in a country. For example in the Netherlands, pig producers are increasingly encouraged to opt for such private schemes (Meuwissen 2000) to shift risk away from government budgets. This development is driven by two main factors: the changing role of government (e.g. less price control but more regulation on the use of medicines) and the increasing industrialisation of agriculture (Meuwissen 2000). Farmers or producers with higher benefits may opt out from the public sector scheme leaving that sector to bear the smaller producers' risk.

3.4.4.2   Supplementary (or choice-increasing) insurance

PLI will be supplementary when it allows quicker access to services, which are generally of higher quality than those provided by the public structure. An

example of such scheme would include Israel's HACHAKLAIT service provider. The scheme operates nation-wide and may also cover diseases that are under the NAHS mandate. This may therefore generate differential access to animal health services and livestock insurance between those who adhere to the private scheme and those who do not. Certainly, not all production types carry the same risks, thus high-risk production may be forced to revolve to private schemes. Depending on who these higher risk farmers or producers are, inequalities may arise, potentially making the PLI scheme regressive.

3.4.4.3   Complementary insurance

Finally, complementary PLI refers to those schemes which deliver services not provided or covered by a national structure. In the livestock sector, an example included in this category could be artificial insemination. Given the 'private good' characteristics of these services, provision is generally left to the private providers which may be organised as an association offering AI service packages for a stated premium (e.g. Israel Cattle Breeders' Association). Such schemes may be highly profitable for users, but will generally leave the lower profit producers unable to pay for their services.

The organisational structure and functioning of these different types of PLI has some similarities with the managed care structures found in the human healthcare setting. The classical example of this structure is the Health Maintenance Organisation (HMO) seen most commonly in the USA but also found in Europe.

In human healthcare, HMOs are the most well known alternative to fee-for-service (FFS) for medical care. However different the origins of HMOs and PLIs might be, their structure and organisation remain similar. HMOs were created as a means of counteracting moral hazard (consumer and provider) associated with FFS payments, whereas PLIs were created to enable farmers to finance highly valued veterinary services not or poorly provided by the state. This might be one of the reasons why most of these structures exist in high production sectors.

HMOs and PLIs are based upon a similar concept: a fixed periodic per-capita prepayment which is paid by consumers/farmers directly to a provider of comprehensive (animal) healthcare services (in some cases including also livestock insurance). The latter concept refers to a structure combining the roles of provider of both medical (veterinary) services and insurance, hence removing at least a part of the hidden information problem. Under this structure, veterinarians or physicians are paid a salary or might be contracted by the insurer/cooperative on the basis of a negotiated fixed salary, thus coping with provider's moral hazard. Drugs are usually bought directly from pharmaceutical companies enabling the insurer/cooperative to obtain reduced prices. They can be fully charged to the consumer or partially subsidised by the insurer depending on the type of HMO or PLI. Clinical services delivered by the veterinarian or physician are free at the point of use or might involve a certain fee charge to overcome consumer's moral hazard. Hospitals and/or laboratories might be an integral part of the HMO or PLI but can also be contracted by the insurer/cooperative at a fixed negotiated rate. In the case of HMOs, the state usually gives incentives in the form of tax reductions to employers and employees to enrol in the scheme. PLIs do not always involve government support. However it is common to see some government involvement during the

start up phase of the insurance scheme until the cooperative has attained a cost-recovery level (i.e. financial sustainability).

Insurance coverage varies greatly between PLIs. It can be national as in the case of HACHAKLAIT and the "Veterinary clubs", or restricted to intensive dairy or poultry units as in Kenya. However, it is common to see these structures arise first in dairy industries and expand later to other types of farming. This was the case in both Israel and New Zealand's PLIs.

Premium setting and benefit package definitions differ between insurance groups. HACHAKLAIT calculates the fee according to the species served. Payment is regressive according to the size of the herd. The benefit package includes all veterinary and diagnostic costs. However drugs are charged at 100% but can be purchased by the individual farmer either from the insurance company itself or from the market (but drugs are less expensive when bought from HACHAKLAIT as they contract with pharmaceutical companies for drug supply). Benefit packages in Kenya include clinical treatments, herd health interventions (which include advice for persistent health problems such as mastitis, fertility and recurrent tick borne diseases), artificial insemination and vaccinations. In New Zealand packages are restricted to clinical services, whilst operating costs are met through charging for each farm visit. Similarly in Ecuador, the AGSO (Asociacion de Ganaderos de la Sierra y Oriente) delivers, through its "Integrated Programme of Farm Management", a package of services including technical assistance, which covers animal health (vaccinations, diagnostics, parasite control, epidemiological surveillance, control and management of farm records, rearing of calves, etc.) and quality control (especially for milk).

The AGSO represents nearly 5,000 cattle holders, most of them dairy farmers. The objective of AGSO focuses on "defending the interests of its members and to offer services which permit an increase in productivity and a better life for the members and their families" (Kleemann 1999). Up to the beginning of the 1990s services of technical assistance in livestock related subjects where offered free of charge by the Ministry of Agriculture and Livestock (MAG) to farmers in Ecuador. The MAG then recognised the shortcomings the public sector in terms of limited financial and human resources in providing efficient, client-oriented good quality services. It subsequently reached several agreements with AGSO allowing the latter to deliver specific services that were formerly provided by the ministry (such as artificial insemination, veterinary diagnostics and extension services. The conditions of service delivery are fixed in a service contract. To provide services, professionals and/or technicians of AGSO make two visits per month and farm. Samples are analysed in the laboratory of AGSO (or handed to others). The farmer has to pay a fee for the services, which is based on the number of animals on the farm. Clients of this service package are mainly medium-size commercial dairy farms (i.e. 50 ha) (Kleemann 1999).

PLI as a means for funding animal healthcare may have several advantages in practice. First, it enables the demands of certain farmers to be self-financed, leaving the government to target the (limited) public resources on delivery of animal healthcare services to other premises with more externality features. Second, it mobilises additional resources for infrastructure that might benefit both privately insured and not privately insured farmers. Third, it encourages innovation and efficiency, which might catalyse the reform of the public sector because of its flexibility and the profit motive (Mossialos, Dixon, Figueras et al.

2002). Finally, the fourth reason regards the increase of choice of services delivered to farmers.

However, PLI's potential may not be attained as performance depends on its design and regulation and on the way it interfaces with the public sector. PLI also has potential problems in practice. These are, as previously mentioned, moral hazard (mainly consumer moral hazard), adverse selection and/or cream skimming (see sections 2.2.5 and 3.2.2). The latter two arise mainly from the definition of the premium package and associated premiums. Such consequences might hinder the objective of equity in access, an issue also arising when dealing with user charges or out-of-pocket payments.

3.4.5   User charges or out-of-pocket payments (UC)

As mentioned by Robinson, UC can conceptually be viewed as "different positions on a continuum ranging from full third party payment (zero cost-sharing) to full user charges (costs met completely by the out-of-pocket payment)" (Robinson 2002). Following Rubin and Mendelson's (1995) analytical framework for classifying these UC, two types of cost-sharing can be devised: direct and indirect cost-sharing. In the AH setting *direct* cost-sharing will refer mainly to:

(i) Co-payments: which is a flat fee or charge per service. For example, in most community animal health systems in Sub-Saharan Africa, diagnostic and treatment services as well as drugs are charged. In India's Gujarat state, AH services provided at government veterinary dispensaries were free of charge until 1996. However, a nominal fee per visit to the centre was then introduced (Ahuja 1999)), and;

(ii) Co-insurance: which refers to a percentage of the total charge. For example in Bangladesh animal health services are heavily subsidised by the government, e.g. for vaccines the government pays 40% of the cost (Jahan and Rahman 2003), hence farmers pay a percentage of the vaccine price.

Other more sophisticated methods in which direct cost-sharing can be materialised (found in the HH setting) are the so called "deductibles" (a payment covering the first x amount of money before insurance coverage begins) (Robinson 2002).

Indirect cost-sharing would, as in the HH field, refer to the policies that result in out-of-pocket expenditure even if charges are not directly imposed. This refers to policies on the criteria of inclusion and/or exclusion (such as insurance companies which specify which are the services that will and will not be reimbursed, or government policies deciding what services should be privatised), and pharmaceutical regulatory mechanisms (also linked to government policies on, for example, free drugs).

This section focuses on cost-sharing as there is widespread lack of disaggregated data on the UC, both in developed and developing countries. Furthermore, in most transition and developing countries, informal payments tend to represent an important source of direct cost-sharing (for example, when services are supposed to be free of charge but a payment is made by the client to the practitioner for the service rendered). Their informal nature means that they fail to meet the standards of transparency met by formal systems and the magnitude is largely unrecorded, as debated in section 3.4.2. Previous sections have introduced the criteria used to assess such systems (see Adam Smith's principles

outlined in section 3.4.2). Cost-sharing schemes in the animal healthcare sector may also be analysed following the criteria of efficiency, equity, feasibility and acceptability (or compliance).

In the AH field, Anteneh's study in 1984 (Anteneh 1984) listed several sources of cost-sharing schemes in some Sahelian countries. He listed charges related to (i) vaccination, (ii) clinical treatments and (iii) veterinary drugs. As seen from the responses to the questionnaire in Senegal, such types of user charges still exist in that country for diagnosis and laboratory tests, vaccines and drugs. It is worth referring to Musgrave and Musgrave (1989) to point out the difference between charges and taxes. One main disadvantage of charges is that their costs of administration might be too high, even if the charge is desirable. This has been corroborated by Abel-Smith and Rawal (1992) (see below). However, although taxes might be earmarked and used in lieu of charges, the basic dilemma lies in whether the allocation of the revenue would fit the benefit principle (as illustrated by Musgrave and Musgrave (1989) with the example of earmarked taxes for highways and the Highway Trust Fund in the US). Thus charges in the AH sector are used for goods and services where "consumption is wholly rival" (Musgrave and Musgrave 1989). In turns, this relates to previous debates in sections 2.3.1 on taxonomy of goods and 2.4.1 on provision of goods in remote rural areas.

In this context, *efficiency* has several connotations (see also section 4.3.2 for further debate on efficiency). Although there is widespread lack of data regarding user-charges (both in developed and developing countries) such charges can be used by the government with two aims. First, they might be devised as a way to limit or discourage superfluous or "unnecessary" use of

government animal health services, as mentioned in section 2.4.1. Beyond this, disaggregating changes (reductions) in utilisation is important to examine whether these have involved appropriate (effective) or inappropriate (ineffective) services, if these can be distinguished. This, in turn, addresses the effects of cost-sharing on the regional (or national) animal health situation or status. Second, charges may also be utilised to increase government's revenue. In most developing countries the rationale behind their application relates to this objective. This is generally not related to the economic concept of efficiency but rather with government's policy of cost-containment. Cost-sharing could therefore be judged in relation to its success in meeting this objective. However, the desirability of the objective is less well recognised than that of efficiency in allocating resources.

The *equity* criterion is often missing in the AH field and will be further elaborated in section 4.3.1. In the HH field, Chalkley and Robinson highlighted the importance of the payment profile faced by the health service user (Chalkley and Robinson 1997). Of particular interest is the importance of marginal prices and their expected impact on behaviour. Indeed, in a case study of UC in Tanzania in the HH field, Abel-Smith and Rawal (1992) found that such payment method incurs inequity and thus is only recommended for the better off strata of the population. Hence, UC tend to exclude the poorest because of their limited ATP (Abel-Smith and Rawal 1992) (which will be further discussed in section 4.3.1). However, the authors argue that UC imposed on the better off strata of the population might be administratively difficult to implement. This is mainly because, as mentioned earlier (see 3.4.2), in developing countries it might be more difficult to measure wealth as there tend to be an important informal economy.

In the AH field it is also relevant to look at consumers' (stock owners) behaviour when faced with cost-sharing. Such behaviour might greatly differ from low to high potential areas (in a similar way to Abel-Smith and Rawal (1992) findings). In the rural setting, several studies have demonstrated livestock keepers' WTP for AH services (Ahuja, George, McConnel et al. 2000). However, this willingness is not always matched with the ability to pay (ATP). Although the two concepts are highly intertwined, the human health economics literature tends to highlight the different implication of both in the context of consumers' behaviour. Given the similarities pointed out in previous sections (e.g. 2.2.1) between AH and HH, ATP and WTP will be dealt with as in the health economics literature.

It is therefore likely that farmers will tend not to demand AH services even if the services needed are a necessity. This will not only entrench consequences that might have a higher economic impact at a regional (and/or national) level than the income generated from UC, but is also likely to heavily undermine poor farming households' livelihoods. Conversely, in high potential areas, production systems tend to focus on improving productivity levels. Equity consequences in such settings would tend to be less important than ATP if significantly higher. Hence, equity in financing as well as equity in utilisation should be taken into consideration. This refers to the financial burden UC may cause when evaluating their share in relation to income among different socio-economic groups. Thus, the relative elasticity of demand between diverse socio-economic groups will differ. Those in the upper income levels will tend to have higher elasticity. Those farmers in the lower levels will tend to be more price-inelastic given that their subsistence heavily depends on livestock. Nonetheless price elasticity of demand will depend on the good or service traded. Thus, "unnecessary or frivolous"

(Abel-Smith and Rawal 1992) services (also debated following Stiglitz in section 2.4.1) will tend to be price-elastic, whereas those evaluated by the farmer as essential will be price-inelastic.

Although equity and efficiency are the most commonly used criteria in the HH field to assess performance of health systems, other criteria should be taken into account. The *feasibility* of administering cost-sharing schemes should be considered as in some instances the costs of running such arrangements might hinder its main purpose. Finally, *public acceptability* of cost-sharing might be a hotly debated and political issue in many countries. Public viewpoints can represent an important constraint on implementing cost-sharing arrangements.

3.5   Conclusions

International research institutions forecast a significant increase in animal production in the next two decades. Such growth will have several consequences, one of them being the increase in public health threats from animal origin. As a consequence, an increase in demand for animal health services is expected.

AHS have proved to be slow in responding to recent challenges across developed and developing nations. Several factors may affect efficiency and effectiveness of AH services. However, it has often been argued that the scarcity of funding heavily undermines the system's ability to improve and cope with new situations.

A framework has been devised to analyse AHS functional components concentrating on the structure and organisation of existing revenue collection mechanisms across different nations. Special attention has been given to the financing, provision and governance mechanisms of AHS.

Four mechanisms to raise revenue for AHS (and their implications in provision) exist: (i) taxation, (ii) national livestock insurance contributions, (iii) private livestock insurance, and (iv) user charges or out-of-pocket payments. These funding approaches are not mutually exclusive. On the contrary, most AHS rely on a mix of them. The way in which these mechanisms are combined has different consequences in terms of equity and efficiency. However, issues such as feasibility and public acceptability need also to be considered when implementing AH systems.

When focusing on pro-poor policies for the livestock sector the equity criterion will play a central role. Several authors have lately debated the role of the state in agricultural and consequently on livestock production systems arguing that SAP may have left vulnerable groups worse off than in the previous situation. State intervention may therefore be justified in areas where there is market failure (which is the case of most remote areas as stated in section 2.2.5 and 2.4.1), and under social or environmental grounds (Dorward, Kydd and Poulton 1998; Upton and Riviere-Cinnamond 2004).

Most African countries rely on a centralised tax based systems. Hence, it is the ministry of finance making annual budget allocations to the livestock sub-sector. Decentralisation is taking place in most of these countries. This process provides a strategic time for re-organising the funding mechanisms for animal heath and livestock services. In districts where livestock constitutes an important income-generating source, devolving the management of resources collected to local authorities and earmarking those taxes associated with livestock to animal health services may be a suitable alternative. This process would enable local

authorities to obtain a more stable and predictable budget for animal health services, which could then be adapted to local needs. Such alternative would make budget allocation a more transparent process vis-à-vis local population.

Another funding system is that found in some Asian countries (such as Nepal, India, Thailand, Sri Lanka, Indonesia, Malaysia and the Philippines) which seem to have a relatively consolidated culture of using National Livestock Insurance (NLI) schemes (which started in the 1970-80s). These tend to target especially dairy production systems as, being the most lucrative production type, requires heavy investments in high quality productive animals (which are the most expensive).

However, in the case or transboundary animal diseases (TADs) such as AI, regional or even international sources of financing may be needed. The characteristics of TADs draw similarities to the environmental economics sector. In the latter, several regional and international funding options have already been brought forward (e.g. Pearce 1997). Following Pearce's rationale, this area will be debated in the discussion chapter 6.

From the examples described in this chapter, it appears clearly that there is still no enough market access to allow for private goods to be traded. Taking into account the particularity of this situation and the implications associated to animal diseases, it can be argued that regaining a certain level of control over the financing function of animal health services might be needed for developing countries to tackle disease spread. It has also been pointed out that in developing nations scarce are the examples of insurance schemes adapted to the animal health sector and particularities. Funding thus needs to be attached to taxes levied on animals and derived products. Where all taxes or part of them

are allocated to a specific "animal health fund" which would aim at addressing surveillance and monitoring activities or that they are mixed to the rest of the national taxes in the treasury will depend on the public finance structure of the country. However, it has been seen that there are several implications in terms of effectiveness and efficiency. Thus, ideally it would be more effective and efficient having an animal health fund fed with earmarked taxes or levies and which will be located in the department of veterinary services.

For pro-poor animal health services the equity criterion in the implementation is crucial and therefore the choice of funding mechanisms should be tailored to take into account the most vulnerable segment of the livestock keepers' population. The latter tend to be concentrated in rural and remote areas where service delivery mechanisms are often unrelated to the national structures. These delivery mechanisms are examined in the next chapter following a comparative analysis between human and animal health community-based systems.

4 Service delivery through community-based systems

4.1 Introduction

4.1.1 Background

Delivering services in rural and marginalised areas in developing countries has been and remains of great concern in the development arena. Although such services exist in many sectors, there is an especially rich literature concerning community-based health workers (CHW).

Human and animal health systems' similarities have already been discussed in the previous chapters. The parallels between these two sectors in their delivery channels and structures have been pointed out by Leonard (2000), Redmond (2003) and others (Catley 1999; Riviere-Cinnamond and Eregae 2003). This chapter will therefore focus on the extensive experience in the human health sector regarding policy analysis of community-based health initiatives.

As mentioned in chapter 1, the implications of the two systems differ in that human health is regarded at a 'human right' thus, conveying ethical connotations, whereas in the animal health sector trends tend to be driven by economic pressures faced by those producing animal products although there are public health risks associated with AH. Thus, although the two systems are not comparable in terms of driving forces, they have gone through similar situations,

especially in the financial context. Interestingly, their governance greatly differs. Most developing countries were constrained by SAP to cut spending (see section 1.1). As mentioned earlier, in the HH side, a worldwide initiative involving international organisations (e.g. WHO) and ministries of health (MoH) was launched in 1978 (Alma Ata) in order to ensure that primary health care (PHC) was available in rural areas. It is in this context that the concept of "community-based health worker" evolved.

Meanwhile, the same budgetary constraints affected the animal health (AH) sub-sector. However, no attempt of coordination from authorities was undertaken, leaving animal health services (AHS) unarticulated, especially in rural and remote areas. Additionally, privatisation guidelines for the livestock sector were released in 1991-1992 by the World Bank (deHaan and Bekure 1991; Umali-Deininger, Feder and deHaan 1992) with the aim to increase AHS efficiency and effectiveness whilst reducing public expenditure. However, as mentioned in previous chapters, a decade later the results have not proved to be as expected (Dorward, Kydd and Poulton 1998).

At the same time, NGO-led community-based animal health activities started growing in marginalised rural areas. Nonetheless, few linkages existed with the already ill-equipped national animal health system (NAHS). The debate regarding community-based schemes in animal health started as a consequence of the rapid increase of these initiatives, whereas in the human health sector policy analysis at ministerial and institutional levels were performed at a much earlier stage.

It is therefore not surprising that similar concerns to those raised in the human health field are currently being debated in animal health. Issues such as quality

of care, accessibility, sustainability, equity, efficiency etc. are at present hotly debated in the animal healthcare arena at national and international levels (e.g. FAO, OIE and AU/IBAR). Discussion over the aforementioned topics arises from two main reasons. First, significant effort is currently focused on the institutionalisation of CAH systems in developing countries. The aim is to obtain a wider and more coherent AHS coverage at country level to enable regional and/or bilateral trade agreements. Second, CAHWs are seen as important players in poverty reduction development goals for the livestock-dependent poor.

Since the beginning of the debate in the late 1980s, regional differences regarding the evolution and implementation of these systems have been seen. CAH initiatives in West African countries have generally been more accepted than in East Africa (Sones and Catley 2003). Scarce literature exists in Latin American countries regarding CAH systems, although references point out such services have been running for several decades (Mariner, Eulert and Ruiz 2004). In Asian countries, CAH systems do exist but, unlike those in East Africa, government involvement in CAHWs' training and organisation seems to be higher than in other countries (GTZ 1992; IFAD 2004).

Although research has been undertaken on several technical aspects of CAH systems as a consequence of the privatisation process, little attention has been given to policy analysis. Few authors have examined CAH systems from a policy perspective (see for example Catley and Leyland, 2000). As a consequence, CAH services tend to be weakly linked to national structures, making it difficult for rural areas to be an integral part of a national and consistent AHS body.

The purpose of this chapter is not to give a historical perspective on CAH systems, nor to examine the technical limitations hampering CAH programmes' performance (although the qualities desired in CAHWs and their selection process will be analysed in chapter 5). The chapter's perspective focuses on the possible reasons why CAH systems have often been excluded from the wider animal health policy debate and why interest is currently increasing in this area. It is argued that financial constraints and privatisation process are not the only reasons for the apparent faltering support CAH initiatives have been given.

4.1.2   Methodology

In order to be able to make such comparative analysis between animal and human community-based delivery systems, a thorough literature review was undertaken in both fields. In the AH field the literature referring to CAH systems was mainly found in the grey literature and international organisations websites (OIE, FAO, AU/IBAR). In addition, web-based search platforms were used (see table below for further detail on the databases searched as well as the keywords used). Finally, data was obtained through the contacts made in FAO and AU/IBAR. The main criterion for CAH programmes inclusion was their intention of up scaling CAH initiatives (i.e. the number of trained workers in the reviewed programme and/or because it is stated in the aims of the programme) towards a primary animal health care (PAHC) system (i.e. their integration in a wider national animal health policy context). The CAH articles selected may be found in annex 2. In the HH field, published literature was more easily available. Thus, databases such as BIDS, MEDLINE, Ingenta, PUBMED were used.

Databases were limited to articles in English, French and Spanish languages.

Database	Years	Key words used for the search
Ingenta (including Medline)	1997-2002	• Community (animal) health worker
BIDS	1997-2002	• Village (animal) health worker
Web of Science	All years	• (Animal) health services
SIGLE	All years	• Veterinary services
Agris	1975-2003	• Primary health care
Agrícola	1984-2003	• Livestock health
CAB Abstracts	1984-2003	• Economics animal health
PubMed/Medline	1976-2003	• Finance (animal) health services
International Bibliography of Social Sciences	1981-2003	(Available tools in each database were used to expand, limit or combine the above key words)

Table 3: Literature review strategy

4.1.3   Objectives

The objectives of the review are threefold:

1. To undertake a comparative literature review to pinpoint the similarities and differences between human and animal health community-based health service delivery systems;

2. To elaborate the criteria against which CAH initiatives should be evaluated within a national animal health system (NAHS);

3. To place community animal health (CAH) programmes within the context of animal health policy.

4.1.4   Organisation of the chapter

The chapter is divided into five sections. Following the introductory section (4.1), section 4.2 gives an overview of the concept and origin of PAHC in comparison to the human health counterpart (PHC) as well as a definition of a community animal health worker.

Section 4.3 sets the criteria needed in the evaluation of community-based animal health programmes. These criteria are equity, efficiency, access to services, quality of services, financial and human resources.

Section 4.4 focuses on the factors influencing community-based service delivery at national level. Areas such as institutionalisation of CAHWs, monitoring systems and governance of PAHC are discussed.

Section 4.5 brings the conclusions of the chapter as well as policy recommendations related to the guidance and support needed when aiming at scaling up national animal health services delivery through CAH systems.

4.2   The concept of Primary Animal Health Care (PAHC)

4.2.1   Origins of PHC and PAHC

As mentioned in section 4.1, one of the main differences between community-based human and animal health systems is their origin. Community-based initiatives in the HH field started in 1978 with the launching of a highly ministerial and institutional initiative. Although the approach was supposed to be participatory (i.e. 'bottom-up'), community-based initiatives formed an integral part of the MoH of those countries agreeing upon the PHC concept and were

consequently implemented under MoH guidance (i.e. 'top-down'). Thus, PHC literature is rich in examples of nation-wide initiatives on CHWs' organisation, training and financing. Less abundant are examples of punctual, small-scale NGO-led CHW projects. The latter projects have tried to include more participatory methods in their training approaches and methodologies in order to increase community participation and system's sustainability (Skeet 1984; Bastien 1990; Zakus and Lysack 1998).

Conversely, the PAHC approach derives from the dismantling of NAHS. During the SAP period, the gap in service delivery in rural and remote areas with regard to AH started widening. Several NGO-led activities began in rural and pastoral areas as a consequence of the demand of AH services from livestock keepers (see for example the case in Afghanistan (Leyland 1994)). Methods were explored in order to assess the AH problems in these areas. As a response, Rural Rapid Appraisal (RRA) methodologies were designed to "use farmers' knowledge and skills when planning development projects" (Catley and Mohammed 1996). The RRA concept derives from a 1970 initiative originated by Chambers in 1983 as it was acknowledged among development practitioners "the failure of formal data collection methods (particularly questionnaire surveys) to generate cost-effective and reliable data which could be used when planning projects" (Catley and Mohammed 1996). RRA evolved into Participatory Rural Appraisal (PRA), the main difference being farmers' involvement in analysing problems and formulating solutions (Catley and Mohammed 1996). These techniques started being widely used especially in the agricultural sector during the 1970s.

In essence, the main difference between community-based initiatives in the two sectors relates to their strategic planning and governance (see figure 8 below).

These factors have been discussed in section 3.3. Thus, community-based health systems tended to be implemented in a relatively hierarchal manner. In that respect, Nitcher pointed out in 1986 that "while the Primary Health Care concept may have been developed in the name of people, it is beginning to appear to many field staff as top down and better serving political interests of speech makers rather than either health center staff or the community" (Nichter 1986). Considerable debate has concentrated on the lack of use of participatory methods in the implementation of such systems in HH (Nichter 1984). Conversely, CAH initiatives tended to proliferate from grass-root projects, seemingly without coordination. The aim here is to highlight how initial conditions in the policy context may influence the development of such type of initiatives.

It is important though to point out the apparently converging evolution of these two systems since their respective starting periods. On the one hand, research on PHC initiatives tends to question the sustainability and initially assumed cost-effectiveness of the approach given that a high number of large-scale or national CHW schemes receive government support (e.g. salary of CHWs) (Zakus and Lysack 1998). Furthermore, techniques have been sought on how to increase community participation and integration of CHWs into the PHC initiative. As mentioned by Walt, "in pursuance of the goal of Health For All by the year 2000, through Primary Health Care [...], small scale CHW programmes have been converted into large scale programmes. This has often been done hastily, resulting in some loss of flexibility and commitment at the local level [...]" (Walt 1988). In this regard, her recommendations focus on learning from other sectors' experience of community-based workers, especially emphasising agricultural extension workers (Walt 1988).

On the other hand, CAH systems' debate focuses on the institutionalisation of the programmes and workers (Catley and Leyland 2002; Catley, Lynen and Nalitolela 2002; Sones and Catley 2003), seeking to integrate these initiatives into a wider policy context. Main driving forces arise from concerns related to the use of CAHWs in the context of epidemic disease outbreak containment and derived economic and trade implications (OIE 2003). This in turn raises questions first, about the definition of CAHWs and performance of CAH systems and second, about their liability. To whom should they ultimately be accountable?

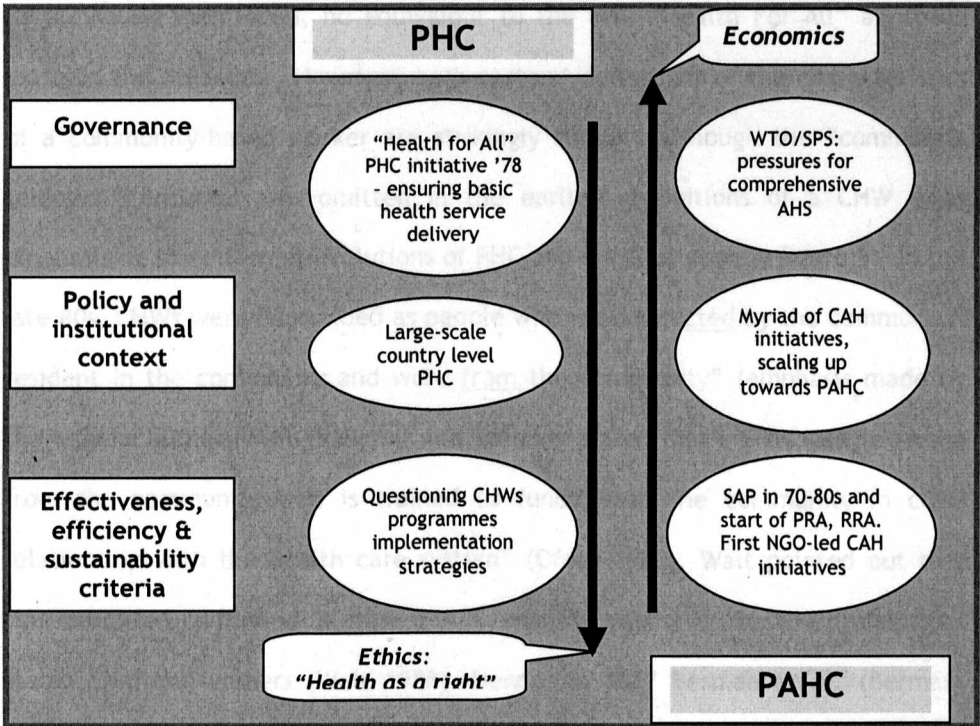**Figure 8: Main differences in PHC and PAHC evolutions**

4.2.2 What is a CAHW?

Following McCorkle (2003), CAHWs "go by almost innumerable names in the literature. 'Barefoot vets' was one of the first [...], modelled on China's barefoot doctors. Others include: paravets, basic veterinary workers, village vets, (village) animal health workers, herder auxiliaries/agents, community animal first aid

workers, community veterinary agents, or (community) animal health volunteers/attendants/assistants, settlement livestock carers, village keymen or village scholars [...] veterinary scouts or 'vetscouts'" (McCorkle 2003). This variety of names reflects not only the diversity of tasks these workers perform, but also the type and length of training received. Yet, as for the human counterpart, it is important to highlight that "the earliest programmes were indigenous attempts to meet local needs" (Walt 1988).

As previously mentioned, no equivalent to the PHC "Health For All" approach exists in the AH sector. However, both sectors' definitions of the characteristics of a community-based worker are strikingly similar. Although the "community selection" criterion was omitted in the earliest definitions of a CHW (thus emphasising the different evolutions of PHC and PAHC as seen in figure 8), in the late 80s, CHWs were "described as people who were <u>selected</u> by the community, <u>resident in</u> the community and were <u>from</u> the community" (emphasis made by the original author (Walt 1988)). It was however stated that a CHW was "a person from the community who is trained to function in the community in close relationship with the health care system" (Ofosu 1983). Walt pointed out that this definition continued to change and emphasis was given on the professional status of these workers (Walt 1988). Hence, in 1987 Berman et al. (Berman, Gwatkin and Burger 1987) stated that "they may be volunteers or receive a salary. They are generally not, however, civil servants or professional employees of the Ministry of Health" (analogous statements were propounded other authors (Scholl 1985; Robinson and Larsen 1990)).

Similarly, in the early 2000s, CAHWs are seen as persons who "live and probably grew up in the community concerned. The CAHW is known and respected in the

community, is recognised as a knowledgeable livestock keeper, and was selected for training by the community" (Catley, Blakeway and Leyland 2002). Moreover, they do "not receive a salary from the state, but for a limited time is given money through the non-governmental organisation's programme. The aim of the CAHW is to make a living by selling his or her livestock services, and for the programme to become self-sustaining" (Martin-Curran and MacLehose 2002).

However, both in human and animal health settings, community workers may be seen, as labelled in the HH field, as "change agents" at community level, enabling people to organise themselves and increasing knowledge at local level (Nichter 1986; Rifkin, Muller and Bichmann 1988; Stewart 2002)..Berman pointed out that "[...] CHWs are more than just a health services technology. They are the reflection of a political struggle to change the emphasis of rural health systems" (Berman, Gwatkin and Burger 1987). Following the same lines, Skeet emphasised that in the context of PHC, development goals need to be put first and thus, that "the main orientation of health workers is directed to community development that includes health care, rather than to health care alone" (Skeet 1984). Additionally, Bender highlighted that "if priorities have been established by the community, it might very well be that activities directly associated with 'health' are not as high a priority as, says, agriculture, water development, and income-earning activities" (Bender and Pitkin 1987).

The above definitions highlight the different evolutions of the two sectors. Yet, a central issue to both types of community-based systems relates to the criteria against which the initiatives should be evaluated.

4.3   A framework for analysing CAH systems

Walt (1988) states in her review of CHW programmes that an alternative way of defining community workers is by examining the tasks and functions they perform in the community and evaluating how effective they are. As in the HH literature, the activities that CAHWs perform in the selected literature review remain relatively similar. Clinical work and drug selling appear constantly as main tasks undertaken by community workers in the AH field, probably because the worker's earnings generally heavily rely in such activities. Prevention and extension services are not performed as often as it would have been expected or desired. Again, this relates to the characteristics of goods and services outlined in section 2.3 regarding the degree of publicness.

As outlined in section 3.4.2, the principles used to evaluate a tax system refer back to Adam Smith. When applying those principles to the health context, these criteria used for health system evaluation are generally (i) equity, (ii) efficiency, (iii) access to services, (iv) quality of services, (v) financial and (vi) human resources (Kutzin 1997; Kutzin 2001).

Following the similarities between systems already outlined in previous chapters, these criteria will be used in the context of CAH systems as they are seen as the delivery branch of a national animal health service. However, it should be noted that such criteria are here compartmentalised, but that in practice, strict limits and separations are difficult to establish. Thus, for example, issues regarding equity may affect efficiency as well as access to services. Criteria individualisation is used here for analysis simplification.

4.3.1　Equity

The equity criterion in health system's evaluation may be interpreted in several ways (equity in access will be elaborated later in section 4.3.3). In health economics, as mentioned by McPake *et al.* (2002), "equity might imply equality of: *(1)* expenditure per capita, *(2)* inputs per capita, *(3)* inputs for equal need, *(4)* access for equal need, *(5)* utilisation for equal need, *(6)* marginal met need, *(7)* health". It can also be argued that some of these definitions of equity might be equivalent to those used for the allocative efficiency criterion when need is defined as "capacity to benefit" (McPake, Kumaranayake and Normand 2002). Similarly Kutzin points out the several dimensions of equity such as "equity in finance", "equity in receipt of care" and "equity in health status" (Kutzin 1997). Mooney characterise equity in terms of "vertical" equity (i.e. equal payment for equal needs, thus relating to the progressivity of the system) and "horizontal" equity (i.e. equal services for equal needs) (Mooney 1992). Further debate on equality has been brought forward by Muurinen and Le Grand, especially regarding equality of access in (human) health (Muurinen and Le-Grand 1985). The definition chosen for the analysis of a health system (or sub-component) will depend on the health policy objectives of the system.

Equity, thus, relates to the concept of 'fairness' in a given system (Musgrave and Musgrave 1989; Stiglitz 2000). If the animal health policy objectives of CAH systems are to make AH services readily available and affordable for poor livestock keepers in rural and remote areas, equity may be analysed following the vertical and horizontal definitions.

4.3.1.1   *Vertical equity*

Vertical equity in the CAH context therefore refers to the progressivity or regressivity of the system (Musgrave and Musgrave 1989). That means whether those livestock keepers less well off pay less for the same services than those 'richer'. Several studies have already pointed out that most poor livestock keepers are willing to pay for animal health services (Ahuja, George, McConnel et al. 2000; Chipeta, Hoydahl and Krog 2003; Ahuja 2004). In the hypothetical situation of a perfect market, WTP may well represent consumers' own benefits for any given distribution of income. In the economic literature, WTP and ATP are closely linked. As Musgrave and Musgrave highlighted, "ideally, [the ATP] measure would reflect the entire welfare which a person can derive from all the options available to him or her, including consumption (present and future), holding wealth, and the enjoyment of leisure. Unfortunately, such a comprehensive measure is not practicable" (Musgrave and Musgrave 1989).

In health economics though, these two concepts are often dealt with separately (McPake, Kumaranayake and Normand 2002), mostly due to the existence of market failures (especially due to the information asymmetry arising in the healthcare sector). Indeed, McPake, Kumaranayake and Normand (2002) highlight that "there are objections to using estimates of willingness to pay as measures of benefits [of a given service or good], not least because willingness to pay is closely related to ability to pay". Given that, as seen in chapter 2, the animal healthcare market presents similar market failures (section 2.2.5) as the human health counterpart, the same doubts will arise regarding how representative the WTP is as a user's own measure of benefits in the animal healthcare context. When focusing on vertical equity the debate is thus concerned with the ATP

principle. Indeed, Abel-Smith and Rawal (1992) pointed out similar concerns in the HH field in the aforementioned example in Tanzania (see section 3.4.5). However, the ATP concept dates back to thinkers such as Rousseau and Stuart Mill and redistribution-oriented writers in the twentieth century (Musgrave and Musgrave 1989).

Turning to the AH field, CAH systems are generally based on a fee-for-service (FFS) payment (see the initiatives reviewed in annex 2). It is assumed that this type of payment method incurs vertical inequity as payment is not related to income. This in turn is related to the elasticity of demand for goods or services debated in section 3.4.5. Thus poorer households tend to spend a bigger share of their incomes in buying services than those more well off. Several of the studies reviewed in annex 2 point out that richer livestock keepers tend to receive more services from CAHWs than the others. This is the case for example in Peru (CARE-Peru 2001), India (Orissa) and Kenya (Chipeta, Hoydahl and Krog 2003). Although prices of services provided by CAHWs are much lower than those that a veterinarian would charge, poorer households are often reluctant to seek CAHWs services because of their low ATP. In these examples thus, charges for service provided effectively limits demand in poorer households. However, the nature of the services and goods of which demand is reduced is not described in these studies.

Several mechanisms have been implemented (informally) to overcome this hurdle such as payment in kind (Hanks, Oakeley, Opoku et al. 1999), delaying payments or even adapting fees charged to the income of livestock keepers[20]. The latter has also been illustrated in the human healthcare field (Berman 1984). These

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[20] M. Upton, Professor Emeritus, University of Reading, personal communication, 2003.

mechanisms may be seen as 'exemptions' from the system to overcome the vertical inequity arising from a FFS delivery system. Such exemptions however have important implications when focusing on the economic viability and sustainability of the CAH system (see section 4.3.5).

4.3.1.2   *Horizontal equity*

Inequity may also arise when the principle of "equal treatment for equal need" is not satisfied. Following Musgrave and Musgrave (1989) thus, "the horizontal equity rule merely applies the basic principle of equality under the law". Horizontal equity therefore refers not only to having equal medical treatment for equal need, but also relates to utilisation (e.g. equal CAHW's time spent for equal need) or access (e.g. equal waiting time for equal need). The latter is dealt with in section 4.3.3.

CAHW schemes have generally been implemented by several NGOs in the field. Government collaboration or coordination is not always present, although its presence is more often associated with CAH schemes in Asian countries. For example, in Cambodia (IFAD 2004) VAHWs are trained for a period of 6 months, whereas in Peru (CARE-Peru 2001) training lasts for 26 days (equivalent to 290 hours). The fact that several agencies train these workers leads to different training curricula and length. CAHWs' knowledge might greatly vary between countries, but here concerns focus on variations within a country or even within a district. Consequently, horizontal inequity may arise for example, when two livestock keepers in two different regions of the same country have the same animal health problem (for example an outbreak of AI). Due to the different trainings of CAHWs, treatment for the same condition in the two regions may

greatly vary. Hence, in one region the AI outbreak could rapidly be under control, whereas in the other region the virus would continue spreading. This example highlights also Williamson's governance concerns raised in section 3.3.3. Consequences associated with such governance situation might incur high costs at national level at both public health and national economy levels.

Horizontal equity is thus a criterion that needs to be analysed when evaluating the scaling up of community-based animal health activities. A standardised curriculum at a national or district level (depending on the degree of decentralisation of the country) for CAHWs would thus be desirable in equity terms. Suggesting a standardised curriculum will however encounter difficulties at two levels: (i) professional level, as there will be pressure coming from other AH professionals, and (ii) implementation level, as the reality is that those NGOs working in a given country implement different CAH models (thus applying different curricula).

The latter will be debated in section 4.4.3. With regard to the former, although some aspects will be debated under the issue of institutionalisation (section 4.4.1), similarities arise with the HH counterpart. Even if some members of the veterinary profession have been reluctant to changes towards CAH, the original idea has often come from progressive members of such profession who have promoted the idea of CAHWs and have persuaded policy makers and politicians to support CAH systems (e.g. Catley and Leyland for East Africa). Nonetheless, involvement of other professionals in the AH field should not be overlooked if systems have to become sustainable. Thus attention should be drawn to the involvement of other AH professionals such as animal health assistants (AHA) or

technicians (AHT) especially taking into account that CAHWs may aspire to these professional categories.

However, the trade-off between equity and efficiency is not always easy to delineate. Hence, as mentioned by McPake, Kumaranayake and Normand (2002), considering perfect market efficiency will certainly contrast with the equity criterion if the theory of the 'second best' is not taken into account. The theory of the 'second best' states that "once an irremovable distortion is located in one sector of the economy, the implication is that meeting marginal conditions in the other sectors is no longer desirable" (Cullis and Jones 1998). In the context of CAH systems, application of the equity criterion will lead to reduce efficiency as it would imply, for example, redistribution of public funds.

4.3.2   Efficiency

In the HH context, there has been a wide debate concerning efficiency of the PHC approach and the related workers. There are two schools of thought, one which was labelled as 'comprehensive primary health care' concentrating on the processes of health development, and another labelled as 'selective primary health care' focusing on the identification and transfer of "specific, effective and economical technologies designed to reduce disease" (Rifkin and Walt 1986). In 1986, Rifkin and Walt debated these two approaches to PHC in relation to their underlying assumptions and expected objectives regarding efficiency in health improvement.

Walsh and Warren (1980) first introduced the concept of selective PHC. They proposed a concrete methodology on how to tackle the most prevalent diseases in developing countries within a limited budget (Walsh and Warren 1980). The

concept was thus appealing as it propounded cost-effectiveness arguments. However, this approach to PHC was criticized by several authors (Berman 1982; Gish 1982) mainly because this point of view of health ignores arguments of development economists regarding "the role of health care and its relationship to increased production" (Rifkin and Walt 1986).

Conversely, comprehensive PHC sees PHC as a tool for community development that does not work in isolation from other sectors. As mentioned by Mahler, an "action undertaken outside the health sector can have health effects much greater than those obtained within it" (Mahler 1981). Rifkin and Walt thus conclude that "health is not merely a disease problem but a development problem" (Rifkin and Walt 1986). The critical difference between these two viewpoints lies thus in the control of inputs and outcomes of health improvements and on what timeframe it is realistic to achieve the expected results.

Similarly, in the AHS delivery sector, Primary Animal Health Care (PAHC) might be understood as a mere tool for disease control or eradication, thus exclusively focusing on animal health inputs and outcomes. However, following the HH counterpart concept of comprehensive PHC, PAHC approach might also be understood as a way to promote rural development. Under this broader poverty reduction objective, PAHC would give special attention to increasing animal productivity while reducing the related public health risk and ultimately enabling economic growth in rural areas through marketing of livestock and livestock products. However, as exposed in section 2.2.5, market failure exists at several levels in the AH sector and failures are especially acute in rural settings. Along Stiglitz's lines, the reasons for market failure in the animal health care market

have already been argued in <u>chapter 2</u>. However, even taking into account these constraints, maximising efficiency still remains one of the main objectives in AH markets. To that aim, community-based workers are seen as a means to reduce some of these failures. In addition, they may be considered as a transaction costs minimiser tool. Given the adaptation of Williamson's transaction theory outlined in section <u>2.2.5</u>, CAHWs may help in reducing the information failure in those areas, thus improving individuals' rationality when choosing. They are also seen as asset specific with respect to users. However, the opportunistic self-seeking behaviour may well still remain. Contracts in these areas need thus to be based on 'trust'. The latter will be debated in the case study chapter (section <u>5.4.1.1</u>).

Following the above debate, CAH systems may be analysed through two different prisms in terms of efficiency. These refer to understanding CAH systems and the related workers either as an "animal health technology", thus the efficiency debate would relate to their 'technical efficiency', or as a rural development tool, hence focusing on their 'allocative efficiency'.

4.3.2.1   Allocative efficiency

In a perfect market situation, resources are supposed to be optimally allocated through market forces. An allocation is thus Pareto-efficient "for a given set of consumer tastes, resources, and technology, if it is impossible to move to another better allocation which could make some people better off and nobody worse off" (Begg, Fischer and Dornbusch 2000). In practice though, the resource allocation process generally involves choices related to the equity-efficiency trade offs. An important policy issue at the allocative level is thus how priorities are set for the allocation of the scarce animal health resources. Therefore,

allocative efficiency in the context of AHS aims at evaluating if an activity is worth being pursued.

In human health the purpose of using CHWs as part of the PHC approach was adopted at a highly institutional level under the assumption that it would be an efficient way to allocate resources to improve rural population's health status. PHC's (and hence CHWs) main target was to provide "'essential' health care to individuals through their first level of contact with a national health service [which commonly is] a rural health worker" (Stone 1986). It was thus assumed that PHC was an efficient means to deliver health outcomes to rural areas in the context of a national health structure. Yet, as mentioned earlier, CAH systems started in a context where no such PHC equivalent existed, thus no overall objective was stated. It is thus easy to find in the AH literature that perceived objectives of CAH systems differ across studies. CAH objectives may vary from improving human nutritional status through increased animal production (Dolberg 2003), to more focused objectives such as reducing animal disease incidence or mortality (Leyland 1994; CARE-Peru 2001; Huttner, Leidl, Pfeiffer et al. 2001; Catley 2002). Martin-Curran and McLehose, in their systematic review of cost-effectiveness of CAH systems, have already pointed out the variety of objectives driving CAH systems (Martin-Curran and MacLehose 2002).

As stated in the introduction chapter, the ethical implications in CAH systems evaluations would seem to be lower than in HH. However, methodological difficulties in designing scientific evaluations satisfying both quantitative and qualitative standards are important. While assessing variations in animal mortality or animal disease incidence might be a way to evaluate effectiveness of CAH systems, designing evaluations that demonstrate the impact CAH systems

have on (human) nutritional status, health or welfare might prove to be difficult. This reasoning follows the lines of Pearce in environmental economics. Indeed, he points out the complexity of evaluating interventions in this area given the often intangible nature of externalities arising from such an intervention (Pearce 1996). However, it is assumed that increasing animal health and productivity have positive externalities such as improving human nutritional status and welfare. This falls into the broader definition of AHS that has been elaborated in section 2.2.2 and in the previously debated concept of PAHC as a development tool.

The AH literature reviewed in annex 2 points out that impact assessment has generally focused on livestock health status (i.e. technical efficiency), and not on the broader objectives stated for the CAH systems (i.e. allocative efficiency) as the latter may have broader development policy implications.

4.3.2.2   Technical efficiency

Following Begg, "the production function summarises the technically efficient ways of combining inputs to produce outputs". Thus, "a production function is technically *inefficient* if, to produce a given output, it uses more of some inputs and no less of other inputs than some other method that makes the same output" (Begg, Fischer and Dornbusch 2000).

As previously mentioned, CAHWs may be considered as an animal health technology tool. In such case, it is important to highlight that CAHWs are complex 'goods' as they are dependent on several inputs, which may be tangible (e.g. drug supply) or intangible (e.g. skills, training etc.) or associated with

externalities. Given that "the production function is the list of all techniques that are technically efficient" (Begg, Fischer and Dornbusch 2000), the production function for such type of technologies is more complex than with other simpler or more easily quantifiable tools.

Several techniques, similar to those used in the human health field, might be used to analyse costs associated with animal health interventions. These are, for example, cost-effectiveness analysis (CEA), cost-benefit analysis (CBA) and cost-utility analysis (CUA) (Gold, Siegel, Russell et al. 1996). In human health, some of these techniques are highly controversial given that at some stage an economic value needs to be associated to a human health condition (e.g. for DALYs – disability-adjusted life years). This problem does not apply directly in the evaluation of animal health interventions. However, a particular feature of animal health and effectiveness evaluations relates to the negative transboundary externalities arising from production systems in rural areas (e.g. Avian Influenza, SARS, FMD etc). Measurement of the impact or effectiveness of CAHWs intervention in rural areas in preventing or controlling the spread of such diseases is complex. Indeed, similarities may be drawn from the area of environmental economics. For example, the transboundary nature of AI and the complexity in measuring costs and benefits of animal health interventions has common points with intervention measurement in transboundary air pollution (for examples in this areas refer to e.g. ApSimon and Warren 1996; Pearce 1996).

The events of zoonotic disease spread shed light on the importance of economic evaluations of animal health interventions, including CAH systems. Such evaluations may include parameters such as human healthcare costs,

international trade barriers or bans, husbandry costs, loss of livelihood for small producers etc. Inevitably, the choice of the variables included in the analysis will heavily influence the results. Such analysis may also serve as guidance for government's financial resource allocation process. Thus, technical and allocative efficiency are not always easy to separate.

However, effectiveness or impact assessment evaluations of CAH systems may focus on narrower objectives such as effects on (animal) mortality reduction, infectious and parasitic disease incidence reduction (Catley 2002) or even visits of CAHWs or amount of services requested. When viewing CAHWs as an 'animal health technology' it is important to bear in mind the context in which they develop their activities. The animal health care market in rural and remote areas is heavily undermined due to the presence of several market failures as shown in sections 2.2.5 and 2.4.1. Of especial interest to CAH systems are the lack of infrastructure and information. Distance to animal health centres and/or animal health professionals hinders access. CAHWs may thus be seen as a tool to reduce those transaction costs derived from distance to animal health services (i.e. transport costs) as well as reducing to some degree information asymmetry. Thus, as reported by Catley in reference to the East African context, "there is evidence to show that CAHWs not only treat large numbers of livestock but they can also act as effective reporters of disease outbreaks" (Catley 1999). Similar conclusions may be found in other region such as Latin America (CARE-Peru 2001) and Asia (Leksmono and Young 2002; IFAD 2004).

Nonetheless, it needs to be highlighted that several of the reviewed articles in annex 2 lacked of methodological rigour. Indeed, the methodology used during the research is not accurately described, especially in the case of internal IFAD

evaluations. Neither the sample size nor the selection criteria of the samples is well documented in IFAD articles. It is therefore assumed that there might be a bias in the conclusions obtained. Similarly some bias may exist in those CAH systems evaluations made by other development agencies such as CARE or GTZ. However, articles by Catley and Leyland are methodologically sound and scientifically based. It should be mentioned though that both authors are highly involved in the animal health policy arena in the Horn of Africa, which might incur in some bias in the analysis. In addition, a literature review bias may exist as few are the articles stating uncertain or negative outcomes of CAH evaluations (see Hanks, Oakeley, Opoku et al. 1999). Several criticisms over existing evaluations of efficiency in improving animal health status have been pointed out by Blanc, Gori, Kamil et al. (2003). As previously mentioned, effectiveness of CAH systems may also consider broader impacts such as on the nutritional status of villagers. However, seldom are the studies exploring this area as numerous are the technical constraints involved in such evaluations.

4.3.3   Access to services

One of the driving forces of the PHC approach was particularly to increase clinic-based services. As mentioned by Berman, Gwatkin and Burger (1987) "CHWs are expected to reduce both accessibility and acceptability barriers to increasing service utilisation". Though an important feature for human health services, accessibility might be a greater challenge in the case of AH in pastoral or nomad communities. Yet, service accessibility may have several dimensions (some which have already been dealt with in section 4.3.1.1) that are generally associated with transaction costs. These are: (i) physical distance to animal health centres, including uneven access of workers to transport and (ii) social distance. The term social distance here includes differences in access due to gender, wealth,

ethnicity and educational variations between herders and workers as defined by
(Woods 2000).

4.3.3.1   Physical distance

Following Leonard's argument, an added disadvantage in the case of service
delivery in animal health is that mobility of sick animals is generally more
difficult than in the human health counterpart (Leonard 2000). He thus points out
that distance is a deterrent factor in accessing AHS. As for HH (see for example
Abel-Smith and Rawal (1992) case study in Tanzania), CAHWs are seen as a way
to make AH service readily available for smallholders in rural and remote areas.
In the absence of these workers the livestock keeper has to walk with the sick
animals a long distance to reach animal healthcare. Given the health situation of
these animals, livestock keepers might be more inclined to sell the sick animal
rather than losing their value because of the journey to reach the AH centre.
Such behaviour may have economic implications at national level (e.g. FMD
spread) or public health implications (e.g. spread of zoonotic disease such as AI
in Vietnam) as diseases are not diagnosed and contained rapidly.

However, regional differences exist as some Asian countries (e.g. India,
Bangladesh) have developed village veterinary centres (Ahuja, George, McConnel
et al. 2000). These centres would be the structural equivalent to primary health
care centres in HH and are located in rural areas. Pastoralism, as understood in
the African context, is less practiced in Asia. Additionally, infrastructure is
generally less developed in Africa. Thus, for example, in pastoral areas in
Ethiopia (Catley 2002) and in Ghana (Hanks, Oakeley, Opoku et al. 1999) CAHWs
represent an important asset in reducing physical distance to AHS and hence

decreasing inequalities in access to AH services. In Latin America, although smallholders tend to be sedentary, geographical distance to animal health centres has been highlighted as an important constraint, hence putting forward the usefulness of CAHWs (CARE-Peru 2001; Mariner, Eulert and Ruiz 2004).

Though CAHWs may be present in rural and pastoral areas, transport is a key element in enabling them to reach farther locations. Besides the improvements in infrastructure and transportation, transaction costs associated with distance led Woods (2000) to state that a clear distance gradient in the use of AHS exists in Zimbabwe. Woods undertook a paired sample survey study "designated to investigate the influence of VLT [Veterinary Livestock Technicians] and farmer gender on the utilization and efficacy of the veterinary services" and "interviews were conducted with farmers situated at three distance zones from the AHC [animal health centre]" (Woods 2000). In this particular study, methods and analytical tools are explicitly described. However, doubts exits regarding other of the reviewed studies. In particular, criticisms would apply to the methods used in the case of IFAD reports. Nonetheless, examples where such distance gradient is mentioned are the studies in Sudan (North and South Kordofan) (IFAD 2004a), Cambodia (IFAD 2004b) and Thailand (Maskey, Chung, Chuchailam et al. 1992).

4.3.3.2   Social distance

Physical distance and transport are not the only factors limiting access to AHS in rural and pastoral communities. Social distance, understood as differences in access to services due to gender, wealth (debated in section 4.3.1.1 "vertical equity"), ethnicity and educational variations between herders and workers may play an important inhibiting role (Woods 2000).

Different patterns exist in the utilisation of CAHWs' services between men and women. Chipeta, Hoydahl and Krog (2003) stated that "within traditional power structures of male dominance it is highly unlikely that community-based services alone can secure equal attention to men and women". In Kenya, Riviere-Cinnamond and Eregae (2003) found through in-depth semi-structured interviews that communication between male CAHW and female community villagers was generally lacking. Women in these settings tend to ask relatives or other women when AH problems arise. Similarly, in Peru, a CARE-led CAH initiative in Puno (CARE-Peru 2001) based on a group-questionnaire survey showed that women are not generally allowed into training courses even though they are the ones spending longer period of times with the animals, thus recognising earlier animal ill-health status. Analogous examples may be found in other geographical areas. Although other studies have not put forward these constraints (e.g. Ghana (Hanks, Oakeley, Opoku et al. 1999)), such behaviour points out socio-cultural barriers that may hinder access to AHS and knowledge at community level.

On the other hand, differences in ethnicity and educational level of workers may act as an inhibitor in accessing services and knowledge both in the human (Sauerborn, Nougtara and Diesfeld 1989) and animal health fields (CARE-Peru 2001; Riviere-Cinnamond and Eregae 2003). In India (Orissa) for example a study by Pradhan, Ahuja and Venkatramaiah (2003) pointed out the difficulty in training women as Community Link Workers (CLW) because of their lack of education. It was mentioned that "the role of a CLW is very untraditional for women" and that "they must be trained additionally and they must be provided with confidence-building measures" (Pradhan, Ahuja and Venkatramaiah 2003).

Physical and social factors reducing access to animal health services at community level have been analysed. However, once services are available their quality in the context of CAH systems may be questioned.

4.3.4   Quality of services

Demonstrating that CHWs are capable of carrying out basic health care activities has generated a wide debate in the HH literature under the PHC context (Habicht 1979; Berman, Gwatkin and Burger 1987). Similar concerns arise in the AH field with regard to CAHWs' quality of services delivered to livestock keepers. However, the concept of "quality of services" greatly varies between studies. Indeed, quality tends to be associated in the animal health field to the adequate use of drugs (i.e. dosage, expiry date, dilution etc). Nonetheless, criteria such as animal health knowledge and dexterity in performing basic clinical interventions are also often included in the concept of "quality". In turn, concept of quality is highly intertwined first, with the activities community-based workers are allowed to perform, and second to training and refresher courses undertaken.

4.3.4.1   Quality of medicines

Drug selling represents one of the main activities of CAHWs, especially when workers' income derives from it. Questions have been raised in relation to the quality of the drugs and their administration (i.e. dosages) because of the possible economic and public health implications (Dasebu, Escrivao and Oakeley 2003) (i.e. antibiotic resistance, residues). Of special concern regarding public health implications is respecting the withdrawal time period. However, this is more generally associated with settings where production is focused on wider commercialisation. Nonetheless, given the debate on institutionalisation of CAHWs which will be elaborated in section 4.4.1, and the possibility of products

originated in rural areas entering a wider food chain (although this is subject to debate), the existence of residues may be a market exclusion criterion for poor producers.

At the same time, drug selling is one of the activities that CAHWs perform that is more readily subject to Arrow's agency relationship debated in section 3.2.2. Given that CAHWs' income heavily relies on drug selling, community workers may be inclined to increase their income by inducing drug selling, thus incurring provider's moral hazard (Dasebu, Escrivao and Oakeley 2003; Ly 2003). Furthermore, livestock keepers' choice of provider and drug usage tend to be driven by costs and do not generally value intangible services (Ly 2003). It is common to observe smallholders buying from pharmacies, peddlers or black markets and administering drugs without knowledge of dosages and/or quality of the drug. This may contribute to increase antimicrobial resistance, giving rise to public health concerns (which indeed, given the associated spillovers, are difficult to quantify). However, in the context of the Horn of Africa, Catley has demonstrated that community members recognise that drugs sold by CAHWs are of better quality than those livestock keepers may obtained in the black market (Catley 2002).

4.3.4.2   *Quality of activities performed*

Studies such as those in Kenya (Riviere-Cinnamond and Eregae 2003) have pointed out that policy makers and practitioners in the animal health field tend to doubt the quality of services provided by CAHWs. They believe that short and variable training periods and lack of refresher courses do not allow CAHWs to perform quality work. However, Rubyogo, Muriithi, Agumbah et al. (2002)

evaluated CAHWs' performance in Mwingi District (Kenya) when undertaking several tasks. The study was based on a questionnaire used to collect information from a population of 99 CAHWs a working in the area. 40 CAHWs were randomly selected. Quality of services was assessed according to a marking scheme, which took into consideration the CAHW training curriculum, field experience and language capacity. The assessment involved not only the questionnaire but also visual inspection of drugs and equipment. In addition, data was collected within the livestock keeper community through the use of participatory methods. 85 livestock keepers were randomly selected from a population of 250 in the area. The questionnaire covered similar subjects to those of the CAHWs. In addition, secondary - data obtained regarding CAHWs' financial business analysis was obtained through reports of their monthly activity. All questionnaires were pre-tested. The study outcomes showed that CAHWs' quality of services provided was based on a total score of 115 mark and the pass mark was 57.5. Results showed that the 90% of the CAHWs passed the test "despite a very short period of training (14 days initially followed by three-day refresher courses)" (Rubyogo, Muriithi, Agumbah et al. 2002). Similarly, based on "a random survey of stakeholders in the provision of veterinary medicines" based on a mixture of qualitative and quantitative data, Dasebu, Escrivao and Oakeley (2003) conclude in relation to CAHWs and drug administration in Ghana and Mozambique that incorrect administration of unregulated drug misuse was reduced due to the presence of CAHWs. Nonetheless, it should be noted that the sample number surveyed in both countries was not stated.

The quality of services provided has also been associated to workers' qualification. A study in pastoral areas in Kenya shows that community members often mention that they would like to be able to ask the worker for a certificate

in order to know if the CAHW has been officially trained (Riviere-Cinnamond and Eregae 2003). Similar experiences have been pointed out in Peru (CARE-Peru 2001), Sudan (Kordofan) (IFAD 2004a), Ghana (Hanks, Oakeley, Opoku et al. 1999) and Nepal (Stoufer, Ojha and Parajuli 2002). Official certification of CAHWs, though, is usually closely linked to the recruitment and selection process, which will be elaborated in section 5.4.1.

4.3.5   Financial resources

As mentioned in section 4.2.2, CAHWs are expected to earn their living, at least partially, and replenish their drug kits by charging for services provided and drugs sold to livestock keepers. HH literature has also been analysing this subject, but given governments' political commitment to the PHC approach, economic support to the systems has often been more readily available. CAH systems may however be assessed under two highly intertwined criteria: economic viability and financial sustainability.

4.3.5.1   Economic viability

In the context of community-based systems, economic viability is concerned with the immediate availability of funds to pay for the services provided. Economic viability thus relates to the previously debated vertical equity and WTP/ATP principles (see section 4.3.1).

In that regard, as mentioned earlier, it is important to highlight that the majority of CAH systems are based on FFS payments. Given that CAHWs most generally derive their income from selling drugs, cash availability to make the system sustainable is a key element. Furthermore, as in HH, community workers' reputation strongly relies on the availability and quality of the drugs they sell.

Following these lines, Cross, Huff, Quick et al. (1986) mentioned in the HH context that "pharmaceuticals [...] are essential for preventive and therapeutic health services. In addition to their direct health impact, the effectiveness of pharmaceuticals against most common diseases serves to establish the credibility of health workers that they need to promote long-term health improvements [...]". Given the importance of drugs, several schemes have been tested in the PHC context to enhance economic viability in drug selling. The most notable example relates to "Revolving Drug Fund" (RDF) schemes. Thus, in the HH field, RDFs were implemented at a later stage of the PHC initiative given that one of the fundamental principles of PHC was that health services should be free in rural areas. However, it was noticed that governments in developing countries could not afford to pay for the drugs used under community-based health schemes. Indeed, Hanson and McPake (1993) analyse the outcomes of the Bamako Initiative which was launched in 1987 in order to "increase access to drugs through community participation in revolving drug funds". The initiative evolved as a consequence to criticisms over "equity and access, problems of integration management and logistics the relative importance given to drugs an sustainability and dependency" Hanson and McPake (1993). Especial emphasis regarding RDFs was put on the weak levels of managerial skills at community level as well as poor supervision. Monitoring of community-based systems is however analysed in section 4.4.2.

Conversely, as PAHC is driven by economic and not ethical objectives (see section 4.2), CAH systems did not receive financial support from governments. RDFs were thus envisaged as an appealing business oriented approach to CAH service delivery in rural areas. As seen from the reviewed CAH systems, most of the selected articles include RDFs as a main feature for drug selling and kit

replenishment (e.g. Thailand (GTZ 1992), Malawi (Huttner, Leidl, Pfeiffer et al. 2001), Somalia (Catley 1999) etc.). However, limitations hindering the functioning of these schemes have been pointed out and are similar in the two health sectors. Adapting from Cross, Huff, Quick et al. (1986), frequent constraints include:

(i) Inaccurate estimation of cost of capitalization and lack of accurate management and financial planning,

(ii) Failure to collect payment and/or delays in cash flow (undermining the replenishment of drug stocks),

(iii) Drug prices below replacement costs (i.e. low margin),

(iv) Lack of capital funds when there is rapid programme expansion,

(v) Losses related to theft and deterioration,

(vi) Price increases (e.g. due to inflation etc.).

Common to both sectors is that "the monies actually recovered are insufficient to replenish the original drug stocks and the fund is soon depleted or 'decapitalized'" (Cross, Huff, Quick et al. 1986). In the PHC literature it is commonly stated that "one of the most important [factors for the failure of RDFs] appears to be a resistance to thinking of the fund in business terms" (Cross, Huff, Quick et al. 1986). Similarly, in the AH field it is generally mentioned that "many villagers are still reluctant to pay for the services provided to them by the CBAHW (equivalent to CAHW), because they understand them as employees of the government" (IFAD 2004b) and thus expect services to be free. Similar findings were also obtained in pastoral areas in Kenya (Riviere-Cinnamond and Eregae 2003), Zambia (Chilonda and Van Huylenbroek 2001) and Ghana (Hanks, Oakeley, Opoku et al. 1999).

However, alternative mechanisms such as membership organisations have been implemented in other regions, which recall Buchanan's theory of clubs previously debated in section 2.3.1.3. Peru (CARE-Peru 2001), Cambodia (IFAD 2004b) and Kenya (WASDA 2000; WASDA 2002) are examples of countries where membership organisations exist as part of CAH systems. They receive different names as the type of organisation varies between settings. Local politics and political standpoint of the implementing agencies may also affect the labelling of these membership organisations. This follows the lines of Abel-Smith's debate over the manner after which heath systems are named in different countries (Abel-Smith 1992). Thus in Cambodia these are "VAHWs Associations pharmacies" and in Wajir (Kenya) "Pastoral Associations". However, details on the functioning, membership fee and services provided or included through these types of organisations are generally lacking. For instance in Peru the "Asociacion de Sanitarios Ganaderos" (CARE-Peru 2001) was created mainly as a negotiation platform to obtain discounted rates in the acquisition of drugs.

Nonetheless, FFS continues to be the most widely used payment method in CAH systems. Indeed, as discussed in section 4.3.1.1, price discrimination mechanisms may exist in CAH systems as CAHWs may adapt prices to livestock keepers' ATP. Thus, FFS is likely to affect the equity of the system, which is highly intertwined to Arrow's agency motivations stated in section 3.2.2 and price elasticity of demand associated to user charges debated in section 3.4.5. Yet, as mentioned earlier in this section, livestock keepers' behaviour vis-à-vis payment of services that used to be free (i.e. no payment, delayed payment or payment in kind) may heavily undermine CAH systems cost-recovery and sustainability objectives.

4.3.5.2   *Financial sustainability*

Whereas economic viability refers to immediate fund availability (i.e. cash), financial sustainability focuses on the flow of funds in the long run. Service provision may be economically viable but its financial sustainability depends upon the availability of funds (for the provision of services) in the future. Funding mechanisms and options for animal healthcare systems have already been debated in <u>chapter 3</u>. However, these should be matched with population's needs.

In 1983, Segall debated governments' resource allocation methods for PHC. He highlighted the intertwined nature of planning and politics in the promotion of national PHC policies. Interestingly, he pointed out that budgetary systems should identify expenditures by geographical areas and level of care. Especially it was emphasised that "resources should be allocated geographically to reduce health inequalities through the provision of appropriate mix of different levels of care" (Segall 1983).

A similar reasoning may be applied in the PAHC context. In countries where livestock sector's share of agricultural GDP is important (e.g. at province level in Vietnam an example would be Ha Tay province (Riviere-Cinnamond 2005)), funding mechanisms will help enhance government's capacity to generate sustainable and more predictable budgets to be allocated for AH. Thus, nations will be less dependent on foreign aid in case of, for example, epidemic disease spread in their livestock population, which as in the case of Vietnam, may incur a non-negligible public health threat component. Here, as with PHC, depending on the political choice of balance between poverty reduction goals and economic

growth objectives, governments might be interested in allocating resources to the most deprived areas in their countries. Here the terms "resources" is mainly concerned with public funds. However, these might be materialised into animal healthcare professionals, facilities, transport etc as stated in section 3.3.2. The debate on the degree of publicness of goods in the animal health sector has already been debated in section 2.3. Yet, characteristic of the AH field in comparison to HH is the greater involvement of non-governmental organisations in AHS delivery in rural and remote areas through CAH systems.

The literature review in annex 2 points out that NGO - government collaboration in the implementation of CAH initiatives is more common in Asian countries (e.g. Nepal, Thailand etc.). In this region, financial support from the government is generally offered during the initial phases for training purposes as well as for the first drug kit. In other areas, drug kits and training are organised by the NGO itself. Financial sustainability remains, however, one of the focal points in exclusively NGO-led CAH programmes as usually when NGOs withdraw the system tends not to be sustainable anymore. Financial sustainability in these cases is closely related to access to credit schemes in order to maintain the aforementioned RDFs or simply to replenish the drug kit. Links to rural finance institutions (RFI) are thus increasingly seen as a key element for sustainability. Credit, especially micro-credit, is commonly considered during programme implementation (e.g. Peru (CARE-Peru 2001), Cambodia (IFAD 2004b), Sudan (Kordofan) (IFAD 2004a) etc.).

4.3.6   Human resources

Three main aspects need to be analysed when focusing on human resources for CAH systems. These are (i) the worker's remuneration and supervision which are

linked to Arrow's agency theory (see section 3.2.2), (ii) the qualities against which CAHWs are selected and (iii) the actual selection process.

The issue of remuneration has been discussed in section 4.2.2 and will be further elaborated in section 4.4.2.1. Supervision and monitoring of the community worker will be dealt with in section 4.4.2. As for the two other criteria (i.e. 'ideal' qualities and selection process), these would be extensively debated in chapter 5 in the context of Kenyan arid and semi-arid lands (ASAL).

This section has brought forward the main criteria used to analyse community-based animal health systems. The next section thus discusses the areas that need to be taken into account when aiming at scaling up such systems to the national level.

4.4 Service delivery at a national level: Scaling up CAH systems

Previous sections have introduced the concept of PAHC as well as the criteria against which CAH systems should be evaluated. In to order to expand the reach of CAH systems at a national level in rural areas certain institutional and structural aspects need to be addressed.

4.4.1 Institutionalisation of CAHWs

Although the debate of institutionalising CAHWs started in the late 1990s, in some countries (e.g. Kenya, Ethiopia) policy makers and other professionals of the AH sector have been more reluctant to acknowledge the potential usefulness of CAH systems than others (as for example West African (VSF 1998)) or Latin

American countries[21]. Indeed, reluctance from the professional community has also been recorded during the initial phase of the PHC initiative. In 1987 Berman pointed out that "the existing medical system often felt threatened by CHWs and tries to subvert local efforts" (Berman, Gwatkin and Burger 1987). He therefore added that "where CHWs will become a significant component of the rural health system, they should not threaten any of the existing professionals – for example, the clinical practices (public and private) of nurses, midwives, or physicians. Thus the institutional context of large-scale programs may sometimes work to limit the efficacy of these workers" (Berman, Gwatkin and Burger 1987).

Following these lines, the OIE recommended in early 2003 that, "in order to strengthen animal health and veterinary public health services through improved involvement of [...] para-professionals, including CAHW [...], Veterinary Administrations [should] build official linkages with service providers, particularly individual veterinarians and veterinary associations, but also with individual para-professionals, non-governmental organisations and farmers' groups" (OIE 2003). Furthermore, it was stressed that "linkages between Veterinary Administrations and private veterinarians and para-professionals take the form of contracts for the provision of specific services such as disease monitoring and surveillance, animal vaccination, food inspection, and disease control" (OIE 2003). Indeed, OIE concerns related to the debate over funding mechanisms and functional components of AHS elaborated in chapter 3. It would therefore appear that the economic forces driving the burgeoning of CAH systems led the international organisation dealing with animal health (i.e. OIE) to consider the wider implications of lack of coordination between finance, provision and governance as debated in section 3.3.

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[21] Dr Rushton, personal communication, 2003.

Nonetheless, there are regional differences in the integration of CAHWs at the national level as outlined for NAHS structures in section 3.3.4.1. West African countries have moved faster in the integration of these workers into the NAHS either with linkages to public or private veterinarians (VSF 1998), which points out Williamson's transaction costs economics debate as well as governance (see sections 2.2.5 and 3.3.3). As opposed to West Africa, in Asia such workers tend to collaborate more closely with governmental structures (GTZ 1992; Leksmono and Young 2002) than with private practices. In Latin America though, the veterinary profession has not been so reluctant to collaborating with the "sanitarios ganaderos" or "promotores sanitarios" (CAHW in Spanish) as in the Horn of Africa, but have rather acknowledged their usefulness[22]. These regional differences are generally closely related to the historical and political background of the country and/or region (e.g. in West African countries Veterinary Associations - "Ordre Vétérinaire" - are generally highly influential, mostly due to the French colonial period legacy). Indeed, as debated in section 3.4.2 under Adam Smith's criteria for funding mechanisms, acceptability or compliance is an important criterion when choosing one funding mechanism against another (Musgrave and Musgrave 1989).

However, recent conferences (Sones and Catley 2003) have shown that even those countries most reluctant (e.g. East African) to CAH systems (and their associated para-professionals) seem to increasingly accept a "structure whereby the CAHW is linked either directly or indirectly, through an AHA, to the veterinarian" (Riviere-Cinnamond and Eregae 2003). Although in the AH research community participatory approaches have long been emphasised as precondition

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[22] Dr Rushton, personal communication (2003).

for the sustainability of community-based initiatives, efforts to link these programmes to a national system have taken much longer than in the HH counterpart.

At a practical level, community-based structures are far from easy to implement and monitor. Many of the aspects affecting CAH systems' sustainability have been analysed in previous sections. The participatory techniques used in the system's implementation are also a key element and have been dealt with elsewhere (Leyland 1994; Catley and Mohammed 1996; Catley 1999; Catley and Leyland 2001; Catley, Leyland and Kaberia 2002). Nevertheless, the different ways in which CAH systems can be structured might affect the balance between accountability of the worker and sustainability of the system.

4.4.2   Monitoring models and CAHWs' behaviour

In the HH field, Arrow's agency theory (1985) outlined in section 3.2.2, has been extensively applied. Several authors (e.g. Chabot and Bremmers (1988), Robinson and Larsen (1990) etc.) have highlighted difficulties associated with the implementation of community-based initiatives. Especial emphasis has been given to incentives and motivation needed to make the system more sustainable as an integral part of a national health structure (Skeet 1984; Robinson and Larsen 1990).

When focusing on AH, few studies have explored the agency relations existing between the actors at different levels of the animal healthcare structure (Leonard 2000; Ly 2000; Riviere-Cinnamond and Eregae 2003; Riviere-Cinnamond 2004). The literature concerned with Arrow's agency at community level in AH is scarce. Yet, in the rural setting, if CAWHs (whether involved in private, public or

non-governmental initiatives) are to become an integral part of a national animal health structure (NAHS), linkages, roles and responsibilities need to be examined. Figure 9 shows the different types of linkages a CAHW may have in the context of PAHC. These linkages will influence the worker's accountability (i.e. degree of liability to PAHC and the community) as well as the sustainability of the CAH system (such as previously mentioned regarding FFS payments).
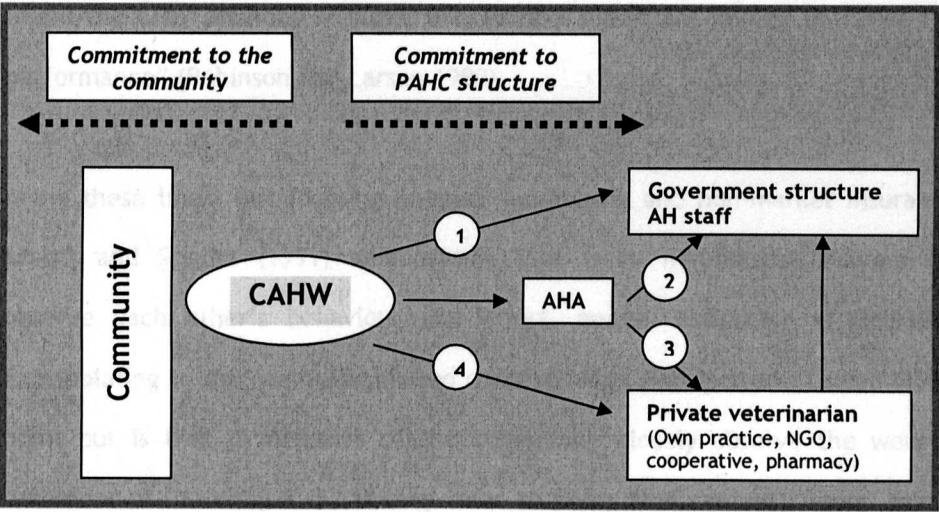

Figure 9: CAHWs monitoring models

In the field of organisational behaviour research, author such as Steers and Porter (1983) or Cook and Hunsaker (2001) have pointed out factors likely to influence workers' motivation and performance in the context of a monitoring system. These include the (i) individual capabilities and skills, (ii) the need for growth, (iii) the rewards and feedback, and (iv) the work environment. Robinson and Larsen (1990) applied this reasoning to community-based health systems, highlighting possible impacts on sustainability and accountability. Each of the 'monitoring models' shown in figure 9 may thus affect the behaviour of those involved in it, to the extent of influencing the tasks undertaken by CAHWs.

Robinson and Larsen devised a framework whereby those elements affecting CHWs' performance and motivation were analysed (see figure 10). It was stressed that the work environment of a CHW is the community Robinson and Larsen (1990). This emphasises that the worker is not in daily contact neither with the national health system nor with the PHC initiative. As a result, they conclude that "it is reasonable to propose that the community, that is, the people to whom the CHW provides services, may have a significant impact on CHWs' job performance" (Robinson and Larsen 1990).

Along these lines, but focusing on peer monitoring and non-market insurance, Arnott and Stiglitz (1991) demonstrate that when non-market insurers can observe each other's behaviour and effort, mutual assistance is desirable. Extrapolating to the community-based context, what Robinson and Larsen (1990) point out is that if members of the community closely observe the work or behaviour of CAHWs (i.e. what they refer to as working context), moral hazard may be less likely to arise than in other forms formal health structures. Indeed, such observation is closely linked to the qualities desired in CAHWs. These will be explored in chapter 5, nonetheless it is worth pointing out that the results obtained follow Williamson's (1979, 1996) reasoning regarding the role of 'trust' in contractual relationships (this will be further developed in section 5.4.1.1 and has been mentioned in section 2.2.5).
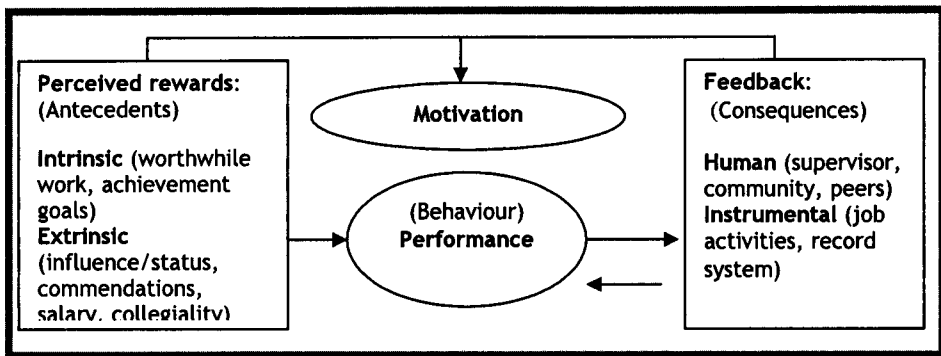
Figure 10: Conceptual framework for CHW performance and motivation (adapted from Robinson and Larsen 1990)

In both AH and HH sectors the worker will tend to be more committed to the community. Commitment has also been pointed out in the case study (see section 5.4.1.1) as a desirable criterion in the selection process of CAHWs. However, although commitment is essential to the sustainability of a CAH system, the worker's perceived rewards, especially earnings, will be highly influential in determining to whom the CAHW is ultimately accountable.

4.4.2.1   Perceived rewards

As mentioned by Propper (1995), although in the context of agency and incentives in the NHS, "the division of the rewards and the constraints on use of assets in these [principal-agent] relationships, and the form of performance monitoring adopted by the government as principal in these agency relationships, currently appears to give relatively limited incentives for either improvements in productive or allocative efficiency". Turning into the rural community based setting, similarities may arise when focusing on perceived rewards to community workers. Thus, extrinsic and intrinsic factors need to be analysed.

Following Robinson and Larsen (1990), extrinsic rewards refer to aspects such as status in the society or salary/earnings. In community-based programmes, the latter has been largely discussed. Bender and Pitkin highlighted that "the issue of payment for the VHW [village health worker] is important from the perspectives of motivation and accountability" (Bender and Pitkin 1987). "Who pays the VHW (the state or the community) will determine to whom he is accountable. Payment by the state may signify greater commitment to PHC by the government, but it also could mean a lesser commitment to the community by the VHW". Yet, "financial support from the community itself is advantageous because it promotes community participation and gives a feeling of responsibility over meeting their own health needs" (Bender and Pitkin 1987). CHWs were however seen from the beginning as an integral part of a national policy on PHC, thus accountable to that structure.

Bearing in mind the different origins and objectives of PHC and PAHC, in both fields the issue of payment *versus* volunteerism of community workers has been widely debated (HH (Walt 1988) and AH (Catley, Leyland and Kaberia 2002; Hadrill, Catley and Iles 2002)). CAHWs are supposed to make their living from the services given to the community at the same time, as they are (supposed to be) accountable (directly or indirectly) to the government structure, given their role as focal point for disease surveillance in rural areas. Some of these tasks are inherently contradictory, especially when confronting preventive and extension services to the CAHWs' main source of livelihood (e.g. services given and drugs sold), giving rise to provider's moral hazard situations (linking to the debate in section 2.2.5), therefore threatening the systems' sustainability.

Walt found that in HH volunteers seemed to be acknowledged as the best alternative to PHC. Nonetheless, voluntarism generally derives from two factors: a secure economic situation and time availability (Walt 1988). These are conditions that are not generally met in developing countries. Especially rural and pastoral populations are heavily burdened with subsistence tasks. Additionally, it is often mentioned that volunteering is perceived "as an avenue to paid work" (Walt 1988). Walt therefore pointed out that "the reality is that most national programmes pay their CHWs either a salary or an honorarium, that almost no examples exist of sustained community financing of CHW [...], and that NGOs tend to find ways of rewarding their CHWs" (Walt 1988). Following these lines, Scholl did also raise doubts regarding "whether non-financial rewards are sufficient to maintain the [CHW] devotion to the job" (Scholl 1985). Similarly, CAHWs are generally motivated by the desire of obtaining employment. Assumptions such as "high attrition rates amongst volunteers as well as amongst CHWs whose remuneration fails in some way [...] suggests that a national programme that relies on volunteers or on the community supporting their CHWs is likely to fail" (Walt 1988) do also apply to the CAH context. However, other reasons existed in the HH field to consider volunteerism as an alternative. Thus, "in some countries, both developed and developing, volunteers are perceived by policy-makers as a stop-gap, or an alternative to government expenditure" (Walt 1988). Such reasoning links to the previously debated choice of relationship between the functional components of health systems debated in section 3.3. Indeed, perceiving community workers as an alternative to reduce government expenditure would also have negative efficiency connotations in the AH field at the purchase-provision level (see the debate elaborated in sections 3.3.1.3 and 3.3.2).

Volunteers, though, were not assumed as the ideal option for CAH. The reason probably lies in the participatory origin of PAHC and its economic focus. Thus, while in the late 80s (i.e. after a decade of PHC start) the HH research community started evaluating the effectiveness of voluntarism in CHW systems (Scholl 1985), CAH research was already focusing on alternative ways to encourage CAHWs to remain active.

Intrinsic rewards, on the other hand, focus on the worker's personal achievement goals. These are more difficult to evaluate. According to Cook and Hunsaker (2001), "intrinsic rewards postulate that motivation is moderated by perceived fairness or discrepancies between contributions and rewards". Social and cultural reasons, for example, have been pointed out as sources of motivation for workers under this category (Nichter 1986). However, intrinsic rewards are closely related to and highly influenced by feedback mechanisms.

4.4.2.2   Feedback

As seen in figure 10, the second factor influencing community workers' motivation and performance may be divided into human and instrumental feedback.

Regarding human feedback, in HH it has often been acknowledged that a "[...] high level job performance among CHWs can best be achieved by having a management system which includes regular contact between the CHW and a local supervisor, a method of evaluating CHW performance and a programme of continuing education" (Robinson and Larsen 1990). In the AH field, difficulties in the monitoring aspect may be greater than in HH as population in the areas

where CAHWs work tend to be nomad. In that context, Catley pointed out that "regarding the need for public sector recognition and supervision of community-based animal health systems to ensure quality of service, even in those countries with well-established government veterinary services there is limited capacity to monitor CAHWs in pastoral areas" (Catley 1999). In Ghana, for example, frequency of supervision of CAHWs by veterinary staff (and facilitated practical refresher training on an informal basis) varied from weekly to once every 6 months (Hanks, Oakeley, Opoku et al. 1999). Variations in supervision in this case were reported to be due to "a combination of low motivation on the part of one or both parties, and transport constraints" (Hanks, Oakeley, Opoku et al. 1999). Similar disparities in supervision patterns (as well as for the associated reasons for such variability) have also been reported in other regions (CARE-Peru 2001).

When focusing on the second element (i.e. instrumental feedback), drug supply plays a crucial role. As mentioned in section 4.3.5, drug selling represents the major source of income for CAHWs. Several studies have pointed out that one of the main factors causing CAHWs to withdraw is the lack of drugs or their high prices (IFAD 2004a). This may be due to the lack of payment by service users, or because there is no availability of quality drugs in the regions. As previously mentioned, it has often been acknowledged that the latter poses an important hurdle for CAHWs as it undermines their capacities vis-à-vis villagers. Therefore, statements such as "paravets were not trusted anymore because their service was insufficient due to their recourse to drugs from the black market which are of low quality" (IFAD 2004a) are often found in the literature (and highlights also the 'trust' issue already mentioned and that will be debates in section 5.4.1.1).

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However, when considering the sustainability and cohesiveness of an AHS delivery system at national level, the political context in which CAH structures function needs to be taken into account.

4.4.3   Governance of PAHC

Central to the implementation of a national AHS delivery system is the concept of governance. This concept has already been brought forward in the previous chapter in section 3.3.3 following Williamson's debate.

Nonetheless, Williamson's (1981) classification of governance structures may be used as a framework for analysis. He classifies governance structures into four categories that may exist in a given "firm" or "organisation" (Williamson 1981). The categories are:

(i)   *Internal spot market*: "human assets that are non specific and for which metering is easy are essentially meeting market tests continuously for their jobs. Neither firms nor workers have an efficiency interest in maintaining the association",

(ii)   *Primitive team*: "although the human assets are here non specific, the work cannot be metered easily [...]. Although the membership of such teams can be altered without loss of productivity, compensation cannot be easily determined on an individual basis",

(iii)   *Obligational market*: "there is quite a lot of firm-specific learning here, but tasks are easy to meter [...] Both firms and workers have an interest in maintaining the continuity of such employment relations" and,

(iv)   *Relational team*: "the human assets are here very specific to the firm and very difficult to meter [...]. The firm here will engage in considerable social

conditioning, to help assure that employers understand and are dedicated to the purposes of the firm, and employees will be provided with considerable employment security, which gives them assurance against exploitation" (e.g. Japanese corporations).

Yet, when focusing on CAH service delivery in rural areas as an "organisation", their governance structure would seem to be that of the primitive team. The work performed by CAHWs is not always easily metered, especially when dealing with public health hazards and related preventive measures (e.g. boiling milk to prevent brucellosis, food hygiene practices etc). As mentioned by Williamson, teams may be altered without much loss of productivity given that trainings are short and that an important part of the work performed would depend on the personal characteristics of the worker (as exposed by community members, see section 5.4.1).

In addition, CAH systems' governance specificities associated with political constraints to equity in AHS delivery in rural areas and to partnerships between public and private sectors, need to be addressed. A large number of animal health service initiatives can be found in African countries post-privatisation, either private (i.e. business oriented) or not-for-profit. According to Williamson (1996), given the absence of a clearly defined governance mechanism, the presence of overlapping activities leads to an increase in 'friction' costs. In addition, the fact that logistics of service delivery are not coordinated between many of these initiatives increases transaction costs. There is also a problem of lack of willingness to harmonise work, not only among for-profit organisations, but especially, and (perhaps) strikingly, among not-for-profit initiatives. Some of the ongoing projects are competing for the same market; hence they have no

incentive to coordinate their logistics, nor their ultimate goals. In Asian countries, the setting is different as most services continue to be delivered, at least in theory, by the public sector. However, government veterinarians have recently been allowed private practice after fulfilling their public duties. This creates an incentive for them to send their 'public' time clients into their 'private' working hours. Hence, inefficiencies (thus costs) arise as practitioners 'draw' work they would be paid for under public funds into 'private' domain.

When focusing on the role of NGOs in service delivery, it was pointed out in HH that in order "to improve the chances of sustainability, the development of coalitions between NGOs and government services is a highly desirable way to promote sustainable development" (Bainbridge 1999). However, in the AH counterpart, it is mentioned that "[...] experience to date indicates that inappropriate government policy has been a major constraint to the effectiveness, coordination and sustainability of the CAHW approach. Policy reform with respect to CAHW roles and public-private sector division of veterinary activities is taking place but progress has been slow" (Catley, Delaney and McCauley 1998). Indeed, Catley, Delaney and McCauley (1998) found that, for Somaliland, southern Sudan and Afar regions, "many of the most dramatic examples of CAHW effectiveness have emerged from areas where in reality, there is no government". This example illustrates how in certain areas NGOs are able to coordinate their efforts and objectives in terms of CAH projects so as to create a comprehensive and cohesive system in the region. Nevertheless, as seen from the literature review, in other settings such as Asia and Latin America, collaboration between government authorities and NGOs has been much more common.

Indeed, not only the aforementioned type of collaboration is desirable, but broader public-private cooperation is needed. Linkages between stakeholders such as farmer associations, cooperatives and pharmaceutical industry should be strengthened. Research in East Africa related to the economic viability of four different models of CAH systems concluded that the most viable in remote areas was that where Animal Health Assistants (AHAs) or Animal Health Technicians (AHTs) owned a pharmacy or clinic and had a network of CAHWs, AHAs/AHTs being regulated by government veterinary staff (Catley 2004). Although doubts have been raised in relation to the economic viability of farmer or pastoral associations, it is argued that these platforms increase farmers' voices in the policy making process (Peacock 2004).

Indeed, an important aspect associated to governance links to the relation existing between national animal health systems and the SPS agreement. The issue has been mentioned by policy makers during the field work in Kenya (see section 5.4.2.2) and will be further developed in the discussion chapter (section 6.2.4).

This chapter has outlined a framework in which to evaluate CAH systems as well as debated several of the institutional and governance problems likely to arise when trying to scale up such schemes. Next section thus brings the main conclusions.

4.5   Conclusions

Recent events of epidemic disease spread such as AI amongst the livestock population (especially in rural areas) have revealed to be extremely harmful for developing nations' economies. Trade barriers and export bans heavily

undermine the already weak economy of most of these countries. Additionally, collateral effects on smallholders' loss of livelihood have worrying impacts on poverty levels. CAH systems may therefore play a central role in public health risk prevention as well as helping improving productivity levels, hence ultimately reducing smallholders' welfare loss.

CAH initiatives started being implemented during the 1970s and 80s as a consequence of the SAP imposed in most developing countries. Implementation process of CAH systems in rural and remote areas was heavily driven by economic development objectives given that livestock represent one of the main sources of livelihood for smallholders in marginalised areas. As opposed to the HH sector, no high level institutional initiative similar to the Health For All PHC approach took place in the AH sector.

At the same time as PHC was implemented, NGO-led CAH systems started growing in rural areas to overcome the lack of AHS delivery and fill the demand gap for these services. While ethical objectives (i.e. health as a right) were the driving forces of PHC, economic growth remained at the centre of CAH initiatives. Whereas PHC was perceived by local communities and researchers as 'top-down', CAH programmes were community-generated. While the AH sector lacked of institutional focus, the HH counterpart lacked participatory rural appraisal methods to increase community involvement in the implementation process.

The comparative analysis between the animal and human health sectors enables gaps in the evolution of CAH systems within the animal health system to be pointed out. These are mainly institutionalisation of CAHWs, monitoring of these

community workers and governance in animal health service delivery in rural and remote areas. CAH systems have thus been put into a wider policy context labelled as PAHC, so as to improve current service delivery in rural areas through CAHWs.

Six main criteria have been devised here as guidance in the assessment of CAH initiatives within the context of PAHC delivery. These criteria are equity, efficiency, access to services, quality of services provided, financial and human resources. Given the similarities existing between human and animal health service delivery in rural areas, these criteria need to be taken into account when considering the scaling-up at national level of community-based programmes. Choices and trade offs between them will be heavily influenced by political decisions at national and/or local levels.

Although the literature on CAH systems in certain geographical regions such as Latin America and West Africa is relatively scarce, regional differences have been highlighted. Even if the majority of the reviewed initiatives prioritise the sustainability of CAH systems, monitoring models differ. Thus, in Asia most initiatives tend to link CAHWs with government staff whereas in East Africa linkages are more likely to be established with private practitioners, government involvement thus being significantly lower in comparison to Asia. It seems however that institutionalisation of CAHWs is being recognised at international level and that reluctant members of the animal health profession (especially in East Africa) are becoming more aware to the usefulness of these workers in delivering services in rural areas.

Therefore, this chapter aimed at learning from the human health sector's experience on scaling up community-based initiatives at a national level. Ultimately, and bearing in mind the public health objective and poverty reduction potential of these systems, it would be desirable to develop a comprehensive animal health scheme to cover rural populations against the spread of animal diseases and enhance productivity in those areas. Although other factors such as infrastructure, access to market and information are crucial when trying to reduce poverty amongst rural smallholders, the chapter has argued the need to include CAH systems into a wider animal health policy context, drawing lessons from the HH sector.

Nonetheless, having laid out a framework for the evaluation of community based initiatives as well as pointed out the governance issues associated to CAH systems, questions remain regarding their wider linkages to trade concerns and their role in this arena. Such concerns will be further elaborated in the chapter 6.

The next chapter focuses exclusively on the human resource criterion mentioned in section 4.3.6 through a case study on the selection process (especially workers' 'ideal' qualities as expressed by community members and policy makers), impact and sustainability of CAHWs in pastoral areas in Kenya.

5 Case study: Community-based animal health workers' selection process, impact and sustainability in Kenyan arid and semi-arid lands (ASAL)

5.1 Introduction

5.1.1 Background

Due to the SAP outlined in the introduction chapter (section 1.1), during the 1980s the poor state or virtual lack of animal health services in a large part of the developing world where livestock are a basic asset economically and socially for a significant share of the population caught the attention of various development organisations. One of the responses that sought to remedy this situation has been based on a mainly NGO-led proliferation of various CAH systems (see section 4.2.1 on the origins of PHC and PAHC).

Community-based approaches to animal healthcare in the Horn of Africa, implemented by NGOs or other organisations, are regarded generally as having performed well with substantial positive outcomes for the communities concerned (Catley 2002; Catley and Leyland 2002). However, it has been noticed that when these organisations withdraw, CAH systems do not continue to operate. Although such failures are generally attributed to the withdrawal of

funds, issues of participation and policy or legal aspects are also likely to be involved (Catley, Blakeway and Leyland 2002).

Particularly in community-based human healthcare systems, there is evidence to show that community involvement in the selection of primary healthcare workers helps to ensure local acceptance and support for these workers. This enhances the sustainability of health care provision even when organisations pull out (Rifkin 1983; Rifkin, Muller and Bichmann 1988; Bentley 1989; Katabarwa, Habomugisha and Richards 2000; Katabarwa, Mutabazi and Richards 2000; Katabarwa, Richards and Ndyomugyenyi 2000; Katabarwa, Habomugisha, Ndyomugyenyi et al. 2001; Katabarwa and Richards 2001; Katabarwa, Habomugisha and Richards 2002). It is thus hypothesised that addressing the differences in selection criteria between communities and professionals could potentially contribute to an increase in the sustainability of CAH.

Policy makers involved in the AH arena in East Africa started in 2002 reviewing policy and legislation on CAHWs. This process is coordinated by veterinary boards but involves various central-level stakeholders such as State Veterinary Services, veterinary associations, veterinary schools and NGOs. The Community-based Animal Health and Participatory Epidemiology (CAPE) Unit of the AU/IBAR supports policy and legislative change in the Horn of Africa (HoA) region. Linking to the CAH system evaluation framework outlined in chapter 4 (see section 4.3), one of the aims of CAPE is to standardise CAHW selection, training and supervision procedures with a view to ensuring quality at national level. Experience to date indicates that draft policies and guidelines tend to prioritise the views of central policy makers above the perceptions and needs of livestock keepers. For example, in the area of CAHW selection it is widely believed by

veterinarians that CAHWs must have received some education and be literate. These views tend to contradict field experience and the relatively high drop-out rate of literate as opposed to illiterate workers[23].

Information on community and professional preferences about selection criteria is largely anecdotal in the AH field. In addition to CAHW selection criteria, the process of CAHW selection is also considered to be important. For example, are the CAHWs selected primarily by professional or project staff, or by the 'community'? Within the community, who makes the decisions concerning CAHW selection: a few powerful individuals or the community as a whole? How are women involved, if at all? What would explain the relative high drop-out rate of literate CAHWs?

Experience to date within CAPE project indicates that CAHW selection is often rushed and driven by project staff with deadlines to meet. This approach can lead to inappropriate selection of CAHW trainees. Providing research-based evidence to the above mentioned process of political and institutional change on communities' desired qualities in a CAHW and an appropriate CAHW selection systems are thus of primary importance for further development and sustainability of community animal health care systems. This chapter therefore examines two areas associated to the human resource criterion outlined in section 4.3.6: the 'ideal' qualities against which CAHWs might be selected and the selection process itself.

5.1.2   Objectives

The objectives of the case study are therefore:

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[23] A. Catley, personal communication, 2002.

1. To identify the ideal qualities of CAHWs as perceived by veterinary policy makers and pastoral livestock keepers;

2. To investigate the relationship between CAHWs selection criteria, selection procedures and the sustainability of CAH systems.

However, before elaborating on the methodology used to attain such objectives, a brief description of the research sites is needed.

5.1.3 Description of the research sites

The three areas selected for the field collection arid and semi-arid lands mostly populated by pastoral (i.e. nomadic) people. They are located in the north-western and north-eastern parts of Kenya. Reasons for selecting these three geographical areas were (i) that the three districts were representative of ASAL areas in Kenya, (ii) the lack of infrastructure and poor service delivery in those areas and (iii) the ongoing CAH programmes run by different NGOs. Nonetheless, each of the studied areas has its specific characteristics, which are briefly outlined in the following sections.

5.1.3.1 West Pokot

West Pokot district is one of the 20 districts of Kenya's Rift Valley Province. It covers an area of 9,100 square kilometres. Its limits are with the Turkana region in the North, the Karamajong cluster in Uganda in the West, Trans Nzoia on the South and Baringo and Marakwet on the East (see map in annex 4). In 1993 the Kenyan Central Bureau of Statistics estimated the population of the District at

320,000 with an annual growth rate of 4.2%. The predominant religion is Christianity.

According to 1997 estimates of the Ministry of Agriculture, Livestock Development and Marketing, West Pokot is mainly constituted by rangeland (44%) and marginal land (28%). 19% of the land is not suitable for agricultural and only 3% and 6% are considered as high potential and medium potential respectively (Southern part).

Annual rainfall is critical to the food production of the district in order to support its population. Rangelands and marginal areas (72%) are the most affected by rainfall variations. Drought appears commonly each 5 - 7 years. Livestock is essential for the subsistence of the Pokot people in the low land areas of the district as almost one third of the residents are characterised predominantly as pastoralists.

A local practice that interferes seriously with social and economic life in range areas is cattle rustling. Raiding livestock is characteristic of pastoral economies in many parts of the country. But access to modern weapons has radically altered the custom. Its practice today has degenerated into something that has no resemblance to the original tradition. The presence and history of the Ugandan international frontier on the West side (a part of West Pokot – from Kongelai (Swan River) to Alale - was until 1971 still Ugandan - see map of West Pokot in annex 4) has also contributed to cross-border raids in recent years. These raids between Pokots and Karamojong (north-eastern Uganda) contribute to drive away an important number of heads of cattle and have claimed several human victims as reported in the news (IRIN 2003; IRIN 2003). Cattle rustling has not only

effects at economic and human levels, but has also repercussions in access to schooling and health facilities.

The most important source of livelihood for these pastoralist families is the sale of livestock. Bulls, goats and sheep are commonly sold to meet household's cash needs such as hospital bills, school fees and food expenses. Cows are rarely sold except as culls or due to old age, as they are a primary source of milk, the main nutritional element for Pokot population. Bulls are often sold for major needs, goats and sheep for relatively smaller cash needs such as purchase of food, clothes and farm inputs. Livestock prices are lowest in the middle of the wet season when food is scarce and farmers need to sell their animals to buy food. Prices increase during the festive season, which normally coincides with the dry season.

5.1.3.2   Wajir

Wajir district is situated in the North-eastern Province. It covers an area of 56,599 square kilometres and has borders with Ethiopia and Somalia, and the Kenyan districts of Mandera, Garissa, Isiolo and Marsabit (see Wajir map in annex 4). The population of the district, and in the whole North-eastern Province, is predominantly Somali. In Wajir there are clans of Kenyan Somali, namely Ajuran, Degodia and Ogaden.

Pastoralism in the district has been subject to constant changes and adaptation. These processes have been accelerated in the past 50 years due to an increase in the number of water points, settlements and the livestock and population growth. The backbone of the economy in Wajir is nomadic pastoralism. Wajir is

based on herding of camels, cattle, sheep and goats. Most of the pastoralists remain nomadic and movement is dictated by the availability of grazing and water.

During the colonial period development efforts in the district were limited. Few schools were built and the percentage in of schooling years was much less than in other parts of the country. Most of the civil servants who came to work in Wajir therefore were neither of Somali origin nor from a pastoral setting. There was limited medical and veterinary care in comparison to other areas of the country.

Following the independence of Kenya in 1963 there was a prolonged period of insecurity. Consequently, government's main concern was insecurity and little attention was given to development aspects. Following the end of the secessionist "shifta" rebellion in the Northern Province of Kenya, government started getting more involved in development. From the 1970s onwards there was an expansion in the government provision of services in all fields. However, in relation to pastoral development, two issues need to be highlighted. First is the top down perspective taken by the government in development. There was little consultation with the communities regarding their own priorities during planning and implementation processes. The fact that most of the government officials came from other parts of the country made it more difficult for them to understand the needs and setting of the Somali pastoralists. Second, in addition to the government top down approach, services were mainly directed to settlements. Therefore no attempt was made to reach nomadic pastoralists.

In the 1990s however a new approach to pastoral development was taken. There are four main factors underlying this approach. First, reduction of government's role in service provision was a consequence of the SAP debated in the introduction chapter (section 1.1). Given that the government was not able to sustain previous spending levels on services, cost-sharing was introduced in a wide range of fields including human health, animal health, education and water. User charges for health services, cost recovery for AH services and handling management of boreholes to the community emerged as cost-containment measures. These measures fall in the debate elaborated in chapter 2, section 2.4.1.1, along Stiglitz's lines. Second, a 'new' development thinking started, which empowered communities over development projects. Government, NGOs and donors continued to be highly entrenched in the process. Third, the number of Somali civil servants steadily increased during the 1980s. Therefore, in the 1990s a core group of Somali (as well as non-Somali) civil servants, who were more concerned with Wajir pastoralist issues, was established. Finally, the 1991-1992 drought pushed towards long term focused programmes in the district. These included Oxfam's Pastoral Development Programme and the Government of Kenya/World Bank Emergency Drought Recovery Programme (later called Arid Lands Resource Management Programme).

The shift in the pastoral development perspective came with the launch of the NGO Nomadic Primary Health Care Programme (NPHC). The idea came from a core of local civil servants and UNICEF as a catalyst. The latter had the aim to raise child immunisation rates across Kenya but it seemed apparent that they were failing because they did not reach arid areas. It was suggested by local districts that existing (human) health delivery systems were not adapted for nomadic populations. Hence, local ministries and UNICEF agreed on training

pastoralists on the delivery on both human and animal health and as nomadic teachers. The term *Daryelle* was used to refer to the community health worker for both human and animal. This approach was agreed between partners and was different to that applied in other districts. The term *Hanuniye* was used for describing a nomadic teacher (WASDA 2000).

5.1.3.3 Marsabit

Marsabit and Moyale districts are located in the Northern Province of Kenya. They border with Ethiopia, Wajir, Turkana and Samburu (see Marsabit map in annex 4). The area covered is of 78,078 square kilometres and has an approximate population of 175,000 (55,000 in Moyale and 121,000 in Marsabit). There are several ethnic groups in each district including Borana, Gabra, Rendille, Burji, Samburu and Ariaal. Other minority groups included are Somali, Turkana and El Molo communities (CIFA 2002). Borana and Gabbra ethnic groups were the most frequented during the field research in Marsabit District.

The area is characterised by a bimodal pattern of rainfall varying between 150 to 800mm per annum. Geographically, the landscape can be divided into the "Ethiopian side" where the Boran Plateau steadily rises towards the Ethiopian Highlands and hilly mountains along the border, and the "Kenyan side" which is composed by dry desert plains (Didigalgallo, Did Golla plains and Chalbi basin). The soil type is volcanic and the main land use is for pastoralism with opportunistic cultivation. Both districts are characterised by long periods of drought, famine, high poverty levels, endemic animal diseases, insecurity and poor infrastructure. These factors contribute to the communities' vulnerability,

anxiety and dependency for their livelihood (CIFA 2002). In addition, as in the case of West Pokot, insecurity is an important concern in the area.

Land use pattern in Marsabit/Moyale district is predominantly pastoralist and agro-pastoralist with approximately 85% of the population practising nomadic and semi-nomadic pastoralism. Agro-pastoralism is concentrated on 3% of the total land area mainly in the highlands of Mount Marsabit, Mount Kula, Hurri Hills, Sololo Hills and Moyale. As the area is composed mostly by nomadic pastoralist the main occupation is livestock keeping. Alternative economic activities are the sale of livestock and livestock products and petty trade. However the remoteness of the area and the lack of infrastructure hinders access to services in these communities.

As in other pastoralist communities, formal employment constitutes approximately 1% and informal employment 10-15% of the total population. The dependant population is therefore of around 85%. Most pastoralists in the area depend on food aid supply and have lost their traditional drought coping mechanisms. During the 1999/2001 period the Marsabit/Moyale area was affected by a severe drought. This led to massive livestock deaths, worsened by the fact that little public animal health facilities were available, the absence of private veterinary services in the area and the long distances to agrovets centres in Marsabit and Moyale. The main consequence of the drought was an increase in the poverty index. The situation was worsened as some of the families lost all their cattle due to lack of livestock disease control (CIFA 2002).

Having introduced the settings where the field research was performed, the next section debates the methods used for data collection and analysis.

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5.1.4 Methodology

Following the comparative rationale of the thesis between human and animal health systems, the methodology chosen for the field research was based on a study by Ruebush_II, Weller and Klein (1994) on community malaria workers (CMW) in Guatemala. Briefly, Ruebush's study aimed at identifying the 'ideal' qualities of CMW as perceived by community members and by PHC staff and health policy makers. Such comparison, it was hypothesised, would shed light on the reasons why community members did not use the community malaria services, which were free of charge.

The study was based on the Pacific Coastal Plain of Guatemala "in an agricultural area producing cotton, sugar cane and cattle" (Ruebush_II, Weller and Klein 1994). In rural areas, illiteracy level may be as high as 60-70 %, whereas in urban settings it ranges from 30 to 40%. Three villages in the department of Escuintla, representative of the Pacific coast, were selected for Ruebush's study purposes.

In order to develop the interview materials, observational as well as interview data was collected in the three villages "in order to understand residents' and NMS workers participation in and perceptions of the CV [community volunteers] system" (Ruebush_II, Weller and Klein 1994). Following the pilot protocol conducted in the selected areas, interviews were conducted with 22 residents and 12 NMS field workers (total of 34 interviews). Each participant was asked the following: "if you had to choose a person as a Volunteer Collaborator, what would you want that person to be like?" (Ruebush_II, Weller and Klein 1994). The

11 qualities most frequently mentioned by respondents were used for the analytical part of the study.

Once the interview materials developed, the study samples, which included residents and NMS workers, were randomly selected in the three villages. The two samples of residents' interviews were taken one in 1985 and the second in 1988. The first sample was composed of 30 people, 15 literate and 15 illiterate and was stratified by gender. Given the result obtained from the first sample and because women tend to have a primary role in family health, the second sample consisted of women only. In addition, an additional sample of 27 NMS was interviewed in 1985.

The Ruebush study aimed at systematically assessing perceptions between community residents with regard to CMWs. Residents were thus asked to priority rank the 11 qualities obtained during the development materials phase. A paired-comparison format, where each quality was paired with each other quality, was used (total of 55 pairs). Pairs were randomly presented during the oral interview with each resident. A single ordering of qualities was consequently obtained for each of the individuals interviewed.

The analytical part of the study was based on Pearson correlations of the rank orders obtained from each individual. In addition, demographic data such as age and literacy was used for descriptive statistics purposes. Concordance was calculated with the average correlation coefficient between sub-samples when there was low intracultural variation (i.e. high agreement in responses).

Given that the Kenyan context and time frame were not exactly the same as those of Ruebush's study, the methodology had to be adapted to the Kenyan pastoral setting. A detailed description of the methods used for the study is elaborated in section 5.2.

5.1.5   Organisation of the chapter

Having outlined the background and context of the Kenyan case study on CAHWs in pastoral areas, section 5.2 presents a detailed description of the methods used during the field data collection. Main results are provided in section 5.3, followed by the discussion in 5.4, which is organised following the framework outlined in section 4.3.6 (i.e. human resources). Finally, section 5.5 brings the main conclusions derived from the field study.

5.2   Methods

The aim of this field research followed the lines of Ruebush's. Thus, one of the objectives was to elucidate the ideal qualities as perceived by community members and livestock keepers, and compare that to policy makers' perceptions. In addition, it aimed at exploring the linkages between selection criteria, selection process and sustainability. Given the timeframe available for the field research (4 months - from the 10th of September 2002 to the 20th of January 2003) it was not possible to strictly follow Ruebush's methodology.

Two sets of semi-structured questionnaires were created for each group: policy makers (PM) and livestock keepers or community members (LK). The sample of PM interviewed was of 28 and that of LK was of 189 (West Pokot n= 72, Wajir n=59, Marsabit n=58). Total interview sample was therefore of 217. Individuals in the communities were randomly selected and an age and sex balance was sought.

Nevertheless, it was not always possible to recruit females in some of the areas for various reasons (which varied from cultural to religious reasons – refer to the description of the setting section 5.1.3). Thus, in West Pokot it was only possible to interview 8 women, in Wajir 2 and in Marsabit 18.

5.2.1   Qualitative-quantitative mixed methods

The credibility debate underlying studies based exclusively on qualitative methods has already been discussed in the literature (Green and Britten 1998; Mays and Pope 1999; Patton 2002; Tashakkori and Teddle 2003; Green and Thorogood 2004a). Following Patton (2002), the credibility paradigm is based on three main aspects: (i) methodological rigour in data collection and analysis, (ii) researcher credibility in terms of background and experience and (iii) "the philosophical belief in the value of qualitative inquiry, that is, a fundamental appreciation of naturalistic inquiry, qualitative methods, inductive analysis, purposeful sampling and holistic thinking" (Patton 2002)[24].

Semi-structured questionnaires aimed at gathering the views of respondents in relation to the study objectives (in section 5.1.2) not only through qualitative data but also through the collection of numerical quantitative data (on age, gender, wealth and years of schooling for LK; on years of field experience, of policy involvement, gender, educational level and affiliation). The underlying reason for mixing qualitative and quantitative methods was based on looking for "patterns of convergence to develop or corroborate an overall interpretation" (Mays and Pope 1999). The use of such a "triangulation method" - a concept developed by Campbell and Fiske in 1959 for social science research (Seale 1999a; Bazeley 2003) - was meant to limit misinterpretations and enhance

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credibility of the results among policy makers. Reasons for choosing the triangulation method relate to policy makers' tendency of being positively biased towards numerical data (Patton 2002). Qualitative data was considered the basis of the analysis, while quantitative data was used to complement (confirming or not) the results obtained through qualitative analysis. As mentioned by Patton (2002), "in essence, triangulation of qualitative and quantitative data constitutes a form of comparative analysis"[25].

Several authors have argued that standard guidelines in qualitative research would be difficult to obtain (Hammersley 1990; Murphy, Dingwall, Greatbatch et al. 1998; Mays and Pope 1999). However, Tashakkori and Teddle point out several validity issues that were taken into account during the process of design the research protocol – including the questionnaire. These validity concerns, which were first stated by (Webb, Campbell, Schwartz et al. 1966), are:

(i)   "Respondent effects", whereby the respondent is aware that he/she is the target of the study;

(ii)   "Investigator effects", referring to errors incurred by the investigator;

(iii)   "Varieties of sample error", which result from the inability of the research to obtain perfect samples (in terms of space, time and/or individuals);

(iv)   "Access to content errors" which reflects the inability of the researcher to obtain "perfect samples of relevant content", and finally;

(v)   "Operating ease and validity checks". This is linked to the irrelevant material obtained through the collection method and also the ability to

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replicate the results obtained (i.e. an observation might be more difficult to replicate than answers from a close-ended questionnaire).

However, as mentioned by Tashakkori and Teddle, it is important to bear in mind the errors that are associated to the specific data collection chosen for the study, in this case: semi-structured questionnaires.

5.2.2   Questionnaires

It is widely known in the qualitative research literature that the choice of type of questionnaire may be influential over the results obtained (Tashakkori and Teddle 2003; Green and Thorogood 2004b). The choice of questionnaire depends on the aim/s of the research (Green and Thorogood 2004b). This holds especially true for settings in which the principal investigator does not speak the local language (Green and Thorogood 2004b). Questionnaire design and interview process were critical in attaining the two objectives stated in section 5.1.2. Design and translation were especially important in the case of the questionnaire targeting the LK group (i.e. Kenyan rural and remote areas). Questionnaires are available in annex 3.

Tashakkori and Teddle have outlined a set of "principles of questionnaire construction" to follow when preparing a questionnaire (Tashakkori and Teddle 2003). These served as guidance for the construction of the questionnaire. But as stated by (Mays and Pope 1999) and others such as (Hammersley 1990) and (Murphy, Dingwall, Greatbatch et al. 1998), validity and relevance are fundamental in qualitative research. Each of these two factors involves making judgements. Given the latter, the group in the AU were the research was

performed was closely involved in the construction of both questionnaires as suggested by Green and Thorogood (2004b).

Taking into account the importance of appropriate phrasing and language to be used in the formulation of questionnaires (Sapsford and Jupp 1996; Green and Thorogood 2004b), context and setting of the interviews, as well as the background of the interviewees, were taken into account by closely involving the research assistant whose background is from pastoral areas (from Turkana, north of West Pokot). This contributed to reduce both the "investigator effects" and "context errors" mentioned in section 5.2.1. In order to facilitate the interview process, a "recall" question (Green and Thorogood 2004b) was used at the beginning of the LK interview to remind the interviewee of the last person who performed as CAHW in their area. In addition, the questionnaire included several "cross-checking" questions in order to ascertain what respondents answered, hence addressing the "respondents' effect" cited in the previous section. An example is the question where the community member has to state the reasons for choosing each of the qualities mentioned (i.e. question 5 of the first section of the LK questionnaire "state the reason/s why you have chosen these qualities").

Wording was also important in the pastoral context (Green and Thorogood 2004b). But given that the interview process included the use of translators, attention focused on the type of answers required from the questionnaires (measurable or precise events). It was therefore crucial for the LK questionnaire to meticulously explain to translators the questionnaire they had to perform (see account in annex 5). Initially, in the field research protocol, it was envisaged that translators would perform the individual interviews themselves and take

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notes in the local language. Ideally the notes would have been translated into English and back translated in the local language in order to check the quality of translation. Nonetheless, it became clear in the first of the Districts visited (i.e. West Pokot) that such procedure would not be possible follow because of time constraints and lack of willingness from translators[26]. As a consequence, translators directly took notes into English. The same procedure was followed in each of the districts visited. Inevitably, this might have incur bias in the note-taking process and hence in the results of the research (see section 5.3.4 for weaknesses of the field collection). The questionnaire was tested in Alale (in West Pokot District) and consequently modified.

PM interviews tended to be more conceptual. The principal investigator worked closely with CAPE's Head of Unit in the design of the questionnaire. His extensive experience in the animal health policy arena in the Horn of Africa as well as his previous experience in PRA in rural and remote areas were valuable assets for interview design and content. The questionnaire was tested with two officers of the AU consequently inserting the necessary modifications.

A detailed account of the people interviewed, field NGOs involved, the process and the composition of the samples is elaborated in section annex 5 for both groups (LK and PM) and for each of the locations.

Nonetheless, intellectual and analytical rigour in the collection and interpretation of data is another important factor influencing the results obtained from the field research. This is discussed in the following section.

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[26] The choice of translators in pastoral areas is very limited.

5.2.3   Data analysis

The field collection aimed at gathering both qualitative and quantitative data. The rationale for choosing analytical methods for both types of data, as well as for the quality ranking correlations, is presented in the following sections.

5.2.3.1   Qualitative data

Several softwares have been developed and updated in order to perform qualitative data analysis. Examples of these include NUD*ist, NVivo, or "Decision Maker" for theory building, "Ethno" for structural analysis and "Ethnograph" for descriptive/interpretative analysis (Green and Thorogood 2004a). These softwares are exclusively a way of "assisting" the analysis, they do not "analyse" the data. The programmes facilitate data storage, coding, retrieval, comparing, and linking but, as mentioned by Patton, "human beings do the analysis"[27] (Patton 2002). Indeed, as put by Green and Thorogood (2004a) "computer packages do not 'do analysis', but they can help both manage and allow to retrieve data quickly"[28]. Analysis programmes may speed up the process of locating themes, grouping data together in categories and comparing passages in transcripts. However, the analysis of qualitative data "involves creativity, intellectual discipline and analytical rigour"[29] (Patton 2002). Softwares are thus tools facilitating data management during the analysis.

Given the sample size (total n = 217) and needs of the field study and the supposedly different perspectives in relation to the research subjects (i.e. qualities and selection process, impact and sustainability), manual coding and

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[28] Page 191.
[29] Page 442.

analysis was considered feasible and the preferred option in order not to miss important links between samples and sub-samples. Thus patterns and themes were obtained through an iterative and systematic process of codification of terms into categories and analysing respondents' citation frequency.

Qualitative data obtained from the semi-structured interviews was systematically collected and entered into Word format by clerk assistants provided by one of the collaborating organisations, the Intermediate Technology Development Group's (ITDG) Community Livestock Initiative Programme (CLIP). Semi-structured interviews' data was analysed manually following an iterative process in order to highlight recurrent themes in respondents' answers. Similarities and differences in relation to the quantitative variables of each group (see below) were also analysed through this systematic and iterative process. In relation to the comparative analysis between sub-samples obtained though the quantitative variables gathered, focus was given to the "selection process" section of the semi-structured interviews as it was considered the most susceptible to variations.

5.2.3.2   Quantitative data

Quantitative data gathered for the PM group was used to stratify the sample in relation to (i) years of field experience, (ii) years of policy involvement, (iii) gender, (v) post graduate qualification and (iv) group. LK group was stratified into (i) gender, (ii) age, (iii) literacy and (iv) wealth. These variables were systematically entered into and analysed with SPSS software. Chi Square Test analysis was performed in the LK group to highlight homogeneity or heterogeneity between districts. Descriptive data was used for PM group analysis

given that the sample size did not allow a Chi Square (Bland 2000). Results related to variables distribution within samples were used to push forward the comparisons in the qualitative data analysis, as previously mentioned.

5.2.3.3   *Quality ranking and correlations*

In order to rank the qualities and obtain correlations between sub-samples, a different approach to that taken by Ruebush's study was used to develop the interview materials. Indeed, the timeframe and logistics did not allow going twice to each of the districts were the field research was performed. Hence, overall rankings for the two groups were obtained by adding the times each quality was mentioned for both groups. At a sub-group level, comparisons between quality ranking were made by attributing a weight to the qualities ranked as first, second and third (weight being 1, 0.6 and 0.3 respectively).

The choice of this precise rank-ordering weighting technique was based on the majority voting and the voting paradox. The voting paradox, also referred in the literature as "paradox of cyclical voting", highlights the fact that no clear winner exists in majority voting (Cullis and Jones 1998; Stiglitz 2000). It has been extensively quoted in the economic literature that the characteristics of the "ideal" political mechanism or set of rules for making social decisions should follow four criteria. These are transitivity, non-dictatorial choice, independence of irrelevant alternatives and unrestricted domain (Stiglitz 2000).

However, in 1963 Arrow showed that such an "ideal" system would not exist, as no system would satisfy all these desired characteristics (Arrow 1963). This is referred to in the literature as Arrow's Impossibility Theorem. As mentioned by

Stiglitz and others, rank-order voting (where individuals rank the alternatives and each rank is assimilated to a specific coefficient then scores are added together, also known as Borda Count) does not satisfy Arrow's Impossibility Theorem as it fails the "independence of irrelevant alternatives" criterion. However, the present study was not aiming at making social decisions but to represent the preferences in respondents' choices in relation to the qualities they desired in community workers fairly.

As mentioned by Weller in her study on shared knowledge and knowledge aggregation, "the weighting procedure maximises information, either achieving higher levels of validity for a given sample size or requiring smaller sample sizes for equivalent levels of validity" (Weller 1987). Given the nature of the LK questionnaire and the flexibility given to respondents on ranking qualities (as they were the ones to state the qualities), the failure of attaining Arrow's criteria would incur in minor biases in ranking. Hence, rank-order voting and weighting in the context of the research study was adequate for the data analysis. Therefore, Weller's 'cultural consensus model', which refers to the abovementioned voting paradox, was chosen for the field collection data analysis.

Such quality rankings were used for the Pearson correlation analysis. Correlation coefficients were used to describe the agreement among priority qualities of sub-samples and between samples. Following Weller, "descriptions of 'typical' or 'average' beliefs or behavioural patterns can be problematic when intracultural variation is large. The accuracy and validity of aggregated responses is a function of the degree of concordance among respondents and the number of respondents" (Weller 1987). In her article, Weller examines the relation between

concordance, sample size and the validity of aggregating across individuals. Two different models were used:

(i) The 'cultural consensus model', which is a generalised solution of the Condorcet problem. The Condorcet Jury Theorem refers back to the French philosopher of the eighteenth century, le Marquis de Condorcet, who stated that "there may not be any majority voting equilibrium" (in Stiglitz 2000), this parallels the aggregation of responses problem and concerns the accuracy of a "majority (voting) rule" and hence relates to the aforementioned "voting paradox", and

(ii) The 'common elements or process model', which focuses on a single unidimensional concept defined by a set of elements that form the pool of cultural knowledge.

Weller's article highlights that the results obtained through the two different models show that the aggregate converges upon the "culturally correct" answers as a function of the concordance among individuals (which in turn is a function of shared knowledge) and sample size. For the two models however, it was found that even with moderate levels of concordance, sample sizes as small as 15 may be adequate to create an accurate aggregate. The validity of an aggregation across people increases as the number of respondents increases as long as the correlations among respondents are positive. "Aggregated responses of more than one informant will be better than a single best informant" (Weller 1987). In relation to the standard deviation (Sd) levels, Weller's study concludes that "standard deviations of 0.20 in knowledge estimates may be due purely to sampling variability, although we would expect more variability to be due to

chance with fewer number of items (<40) and less variability with greater number of items (>40)" (Weller 1987).

Therefore, for data analysis purposes, given that it is only justifiable to aggregate responses when there is moderate to high agreement in responses (i.e. low intracultural variations), concordance among respondents was measured prior to aggregating responses. Concordance was measured by the average of correlation coefficients calculated for each subset of respondents. The correlation coefficient was also used to describe the agreement between sub-samples and samples.

Having described the methods used for the data collection, the next section presents the results.

5.3 `Results

Results include descriptive data, quality ranking and main recurrent answers obtained from semi-structured interviews for both groups, LK and PM. Correlations between LK and PM are subsequently presented. This section also discusses those factors that might have influenced or biased the results.

5.3.1 Livestock keepers (LK)

5.3.1.1 Descriptive data

The main characteristics of the samples interviewed in West Pokot, Wajir and Marsabit are presented in table 4 below. Literacy levels, gender and wealth (measure as a function of the animal possessed) are the main criteria exposed.

	West Pokot (n=72)	Wajir (n=59)	Marsabit (n=58)	Total (n=189)
Age	39.15 ± 11.35	41.18 ± 14.20	40.71 ± 12.87	40.25 ± 12.70
Literacy (%)				
□ literate	47.2	54.2	27.6	43.4
□ illiterate	52.8	45.8	72.4	56.6
Gender (%)				
□ male	88.9	94.9	65.5	83.6
□ female	11.1	5.1	34.5	16.4
Number of Animals				
□ Cattle	17.80 ± 18.36	23.12 ± 26.60	2.91 ± 4.49	14.88 ± 20.51
□ Camels	1.03 ± 6.10	9.31 ± 15.22	5.16 ± 5.15	4.90 ± 10.26
□ Sheep and goats	37.99 ± 40.75	41.66 ± 44.53	32.24 ± 30.54	37.33 ± 39.13
□ Donkey	2.78 E-02 ± 0.24	0.19 ± 1.45	0	7.41 E-02 ± 0.38
□ Poultry	0.18 ± 1.54	5.09 E-02 ± 0.29	0.16 ± 0.56	0.13 ± 1.24

Table 4: Livestock Keepers group descriptive data

5.3.1.2   Quality ranking

Overall quality ranking of the ten most frequently mentioned "ideal" qualities for CAHWs for the three districts can be seen in table 6. Ranking for these qualities was based on samples as similar as possible for each district. Hence, for West Pokot the sample consisted of 21 villagers (8 female -all-, 6 male illiterate and 7 male literate), for Wajir 22 (3 female -all-, 9 illiterate male and 10 literate male) and for Marsabit 23 (11 female, 6 illiterate male, 6 literate male). Each quality was defined through a series of characteristics (adjectives and short descriptions) mentioned by interviewees themselves (see table 6). Question 5 in the LK group questionnaire ("state the reason/s why you have chosen each of these qualities" - see annex 3) allowed verifying the meaning of the qualities stated, as well as helped omitting the aforementioned "respondent's bias" (in section 5.2.2).

The three most mentioned qualities were "trustworthy", "committed" and "responsible". However their position in the ranking varied between districts, as seen in table 5, which point out slight differences between districts (this will also be highlighted through the Pearson correlation analysis in section 5.3.3).

West Pokot	Wajir	Marsabit
Trustworthy	Trustworthy	Committed
Knowledgeable	Committed - Responsible	Responsible
Social person - Polite - Literate	Available	Trustworthy
Committed	Literate	Social person

Table 5: Ranking of preferred qualities per district

Rank	Quality	Terms included in the definition of the quality	Times mentioned
1	Trustworthy	honest	58
2	Committed	committed / hard working / responds to calls/ responds quickly to needs of community / act quickly / obedient/ able to work/ an active person / loyal person/ devoted	40
3	Responsible	responsible / has a family / with children	30
4	Knowledgeable	knowledgeable / experience in AH/ bright/ can grab concepts/ when trained/ pass messages / pass skills to others (advisor) skilful / resourceful/ brave /clever	29
5	Literate	literate / learned	20
6	Mobile	can walk and cover large areas / fit/ young / healthy	19
7	Social person	social person/ good public relations/ accepted by community	18
8	Available	available/ willing to stay in the community/ loves/familiar with local community/ local person	16
9	Owning livestock	being a livestock keeper/owner / familiar with livestock / cares for animals	13
10	Polite	good behaviour / polite/ can listen	10

Table 6: Livestock keepers' group "ideal" qualities ranking

5.3.1.3   Semi-structured interviews

Main results from the LK semi-structured interviews regarding selection process and impact and sustainability are summarised in the following sections (for further details, refer to annex 6).

- **Selection process**

With regard to consultation over the selection process, the majority of the interviewees in Wajir and Marsabit were consulted (76.3% and 66.6% respectively). However in West Pokot 55.5% of the respondents were not consulted. These include mainly women and young men, the main reason stated being that they were "not allowed" to participate.

Candidates were selected by the whole community in Marsabit (96.5%). However in West Pokot elders, opinion leaders or selected members of the community were often those choosing candidates. In Wajir, respondents stated the whole community made the choice in 50% of the cases and selected members of the community in 45.7% of the cases. Nearly all respondents in the three districts were familiar with the candidates. In West Pokot and Wajir, the 38.9% and 41.4% of the interviewees respectively were not aware of the decisions taken during the process but were informed of the result by the elders of the community. In Marsabit, community members were only informed of the final decision taken through a community meeting (34.5%) and through a meeting with the NGO (22.4%).

When asked about how to improve the selection process members of the Pokot communities interviewed suggested the involvement of the black market seller

and traders ("they should be trained as they deal yet with drugs"). Other suggestions included the increase in the involvement of women in the selection process and as potential candidates to become CAHWs as "they are most of the times with animals - goats, sheep and calves- and they are crucial for the cleanness of cows and cattle and key elements in milking". It was also highlighted that "they should be able to administer drugs to animals". Special attention was given to the criteria used in the selection process and to the need of more CAHWs. It was markedly noted that selection criteria should be made public and should be available for all community members. In order to increase fairness to the process, chiefs or authorities should not be involved and an interview should be included during the selection process of the candidates.

The communities in Wajir did also highlight the need for instituting a clear selection process with specific criteria and guidelines. The need to increase participation of women was a recurrent theme, as well as the involvement of the whole community in the selection process, not letting the candidates be selected exclusively by the elders, leaders or Pastoral Association officers. Again, the ideas of including an oral interview of the candidate during the selection process and the need for more CAHWs were mentioned. Most importantly was the insistence of respondents on the need for recognition and accreditation of the CAHWs. Respondents were also keen on enhancing CAHWs' training, equipment and monitoring.

Finally, respondents in Marsabit tended to think the selection process was "good" so that there was no need of any improvement. Especially they highlighted they were "very happy" with the fact that they did not have to pay each time they required the CAHWs services as well as by not having to pay for transport to

Marsabit to buy drugs. However the majority stated the need and availability for more cheap drugs and on giving refresher courses or retraining CAHWs.

- **Impact and sustainability**

All respondents in the three districts unanimously thought CAHWs "are useful". Reasons for that slightly varied between locations (table 7).

West Pokot	
Animal treatment	54.2%
Drug availability	37.5%
Access to services	34.7%
Wajir	
Drug availability & price	50.7%
Access to services	43.5%
Animal treatment	30.4%
Marsabit	
Animal treatment	51.4%
Extension	44.1%
Drug availability	35.3%

Table 7: Reasons why CAH systems are useful as seen by livestock keepers group (frequency in %)

When asked about "[animal] health improvements" seen in the community, all districts respondents coincided on the "reduction of death rates and animal sickness" due to CAHWs' presence. The decrease in disease incidence was mainly attributed to tick-borne infections control and worm control. Hence, followed an increase in animals' body condition and production (milk specially) and reproductive levels. As one of the respondents mentioned, the "[animal] health improvements" noticed were an "increase in livestock production, and this has improved our means of survival as livestock is our main source of livelihood".

All districts agreed that CAHWs could have been more effective had it not been for the lack of training or lack of supplies (see table 8).

West Pokot	
Lack of drugs	85.1%
Lack of training & refresher courses	12.5%
Wajir	
Lack of drugs	89.7%
Lack of skills	23.1%
Marsabit	
Lack of drugs	58.1%
Lack of skills	54.8%

Table 8: Reasons why the CAH system did not work as perceived by livestock keepers (frequency in %)

Improvements to the system suggested by interviewees are presented in table 9 below.

West Pokot	
"To be paid a salary"[30] as it would "make the job more interesting"	36.1%
Increase in drug supply (including human drugs)	34.7%
Increase means of transport	33.0%
More refresher courses	27.7%
Wajir	
Supply of enough and cheap drugs (on a loan basis)	61.0%
More regular training or refresher courses	55.9%
Provision of salary	16.9%
Increase in the means of transport	13.5%
Regular monitoring of workers	11.9%
Provision of accreditation	10.2%
Marsabit	
Increase of drug supply	72.4%
Construction of a drug store (in the location)	53.4%
Increase means of transport	46.5%
More refresher courses	43.1%
Provision of salary	34.5%

Table 9: Improvements of the CAH system as suggested by LK

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[30] By the government or the NGO

Main reasons for community workers to leave their job were the following:

West Pokot	
Lack of drugs	16.7%
Lack of profits	16.7%
Lack of salary	15.3%
Drugs earnings misuse[31]	15.3%
Lack of transport	11.1%
Commitment	9.7%
Wajir	
Lack of salary/profits	33.9%
Lack of drugs	20.3%
Migration	13.6%
Lack of incentives or profits	11.7%
Travelling distances	6.8%
Lack of payment of services by users	6.8%
Marsabit	
Lack of salary/profits	12.1%
Lack of drugs	8.6%
"Found another job"	5.2%

Table 10: Reasons for CAHW drop out as perceived by community members

Therefore, incentives mentioned by interviewees to motivate CAHWs to continue working were:

West Pokot	
Salary / economic	75.0%
Provision of means of transport	37.5%
Availability of cheap drugs	34.7%
Refresher courses and advice from professional staff	13.9%
Wajir	
Salary / economic	42.4%
Availability of cheap drugs	33.9%
Training and refresher courses	22.0%
Increase in margin profit from drug selling	16.9%
Marsabit	
Salary / economic	81.0%
Availability of cheap drugs	67.2%
Provision of means of transport	60.3%
Construction of drugstores	43.1%

Table 11: Incentives for CAHWs to remain working as perceived by community members

The extension messages most frequently passed to livestock and community members were the following:

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[31] Especially because of drunkenness in West Pokot.

West Pokot	
Dosages and administration routes	51.1%
Dipping/spraying	29.8%
Treatment of specific diseases and early reporting	21.3%
Wajir	
Dosages and administration routes	96.5%
Treatment of specific diseases and early reporting	29.8%
Disease prevention	19.3%
Marsabit	
Dosages and administration routes	86.2%
Hygiene and public health education*	36.2%
Treatment of specific diseases	34.5%

Table 12: Extension messages to community members by CAHWs

Note: the terms public health education includes "covering of food after cooking" and the hygiene of the house and the animals' locations. Still in the public health extension, special attention was also given to advising livestock keepers on not drinking milk or eating meat of an animal that has recently been treated, on how to bury the carcasses of animals which died of Anthrax, on not eating dead animals, on burning dirt, on boiling water and on flies and mosquitoes control

Having highlighted the main results of the semi-structured interviews with the LK group, the next sections focus on the PM group.

5.3.2   Policy makers (PM)

5.3.2.1   *Descriptive data*

Main characteristics of the sample of policy makers interviewed are presented below in table 13.

Years of field experience	4.34 ± 6.48
Years of involvement in policy	9.18 ± 9.48
Gender (%)	
□ male	85.7
□ female	14.3
Postgraduate qualification (%)	
□ none	28.6
□ MSc	10.7
□ PhD	60.7
Group-Affiliation (%)	
□ academic	32.1
□ private sector	17.9
□ government	21.4
□ Kenyan Veterinary Association / Board (KVA/KVB)	28.6

Table 13: Descriptive data for policy makers group

5.3.2.2   Quality ranking

The ranking of the ideal qualities of CAHWs as seen by the Policy Makers group are shown in table 14.

Rank	Quality	Terms included in the definition of the quality	Times mentioned
1	Literate	educated / literacy	17
	Trainable/ Knowledgeable	basic AH knowledge/ husbandry / handy / skilled / able to be trained / with training	17
2	Ethnic to/ knowledge of the area	knowledge of local culture	13
3	Trustworthy	trusted / accepted by communities honesty/integrity able to diagnose	10
4	Available	available in local areas/ accessible / local person	9
5	Commitment	commitment / responsible/ motivated / hard working	8
6	Owning livestock		7
7	Social person	public relations / friendly accepted as leaders	6
8	Qualified	qualified	5
	Community generated		5
	Mobile	willing to follow (mobile) /live in the communities physically fit / young	5
9	Ethical	ethics	3
	Interface	acting as an interface/ reporting (vet/ government / communities/ market)	3
10	Knowledge on ethno- veterinary medicine		2

Table 14: Ranking of the "ideal qualities" in a CAHW (policy makers group)

The ranking of qualities was based on the whole sample of interviewees in the group (n=28) and on the times the quality was mentioned. As in the previous ranking, a definition of the terms considered in each quality is stated, based on the answers of question number 3 in the PM questionnaire (refer to <u>annex 3</u>) "Explain why you have chosen these qualities" as, even if the same quality was stated, the meaning could sometimes differ. As seen in the table, ranking of

qualities does not overlap with the livestock keepers' one. Hence, the four most stated qualities in that group are "literate", "knowledgeable or trainable", "ethnic to the area" and "trustworthy". It can be seen from the list that new qualities are mentioned, such as "ethnic to the area", "qualified", "trainable", "ethical", "interface or link" person.

5.3.2.3   Semi-structured interviews

- **Selection process**
Regarding PM's interpretation of the role of CAHWs, respondents with field experience agreed it was "disease reporting and link person" (94.1%) and "delivering animal health services in ASAL areas where there is no other qualified professional" (including preventive medicine and simple curative treatments) (88.2%). Some of the respondents highlighted however that services given by CAHWs should exclusively focus on epidemiological surveillance and not on curative or clinical services. Other roles suggested were (i) extension (on feed and marketing of products) (17.6%), (ii) record keeping (5.9%), (iii) production improvement (5.9%), and (iv) supplementing government services (5.9%).

Regarding how the selection process was done, 35.3% of the respondents with field experience stated the authorities or the government selected the CAHWs (the "chief of the village" being the authorities, and the DVO being the government). In 41.2% of the cases it was the elders or opinion leaders who appointed the candidate/s. In fewer cases (11.8%) the communities and the NGOs were involved in the process.

Strengths of the selection process were only highlighted when the community (with or without NGO presence) was involved. It was stressed that the strength was the "involvement of the community in the selection process". Such involvement would enable communities to select candidates they "trust" (linking with the "ideal" qualities above stated) and who are "motivated to work".

However, when the elders or the authorities selected candidates, only weaknesses were mentioned. These were mainly that the effectiveness of the system was hindered as elders tended to select their relatives. Other reasons included the following: (i) the selected candidates were illiterate, (ii) there were no women candidates, (iii) the selected person was not accepted by the community, (iv) the process was not participatory so the community did not know what the purpose of the project was, (v) mistrust, and (vi) the "business orientation" of the process. When the NGO was involved, main weakness mentioned was the "dependency syndrome" from the community towards the NGO.

When asking the group of interviewees without field experience (n=10), 70% of them thought the whole community should be involved in the selection process as opposed to involving exclusively opinion leaders or elders. They mentioned also the importance of integrating field NGOs in the process so that the CAH system would be more likely to be sustainable.

When asked about the usefulness of the CAH system, all respondents with the exception of 2 thought it was useful. Reasons mentioned were that CAHWs fill the gap of service delivery in pastoral areas as they are available in the community, can live and work in harsh areas and follow nomadic communities.

However, reluctance and scepticism in some of the answers could be noted, mentioning that the best alternative to deliver the services would be the veterinarian. A recurrent theme was the strong need for supervision and control of CAH systems as well as good quality training.

21.4% of the PM respondents stated a contradiction existed between the will of the communities and that of private veterinarians in terms of service delivery to poor farmers. Main reasons being that (i) the private veterinarian services are too expensive for poor livestock keepers' affordability, (ii) community members do not differentiate quality services, (iii) literacy in CAHWs being a primary request from private veterinarians is not always fulfilled and finally (iv) the "work of the private veterinarian is taken over by the CAHW".

However the rest (78.6%) thought there is a link between the two actors citing two main areas of synergy. The first was based on the objective of increasing service delivery to dryland areas, and the second on the idea that private veterinarians are interested in profit-making. Concerns were also raised regarding the economic viability of the system as workers do not always understand the purpose of profit making and drug kit replenishment.

Finally, suggestions and remarks given by the interviewees varied and did not only cover selection process but also other issues. Therefore livestock keepers' access to markets and slaughterhouses was raised as well as concerns regarding the viability of the system. The latter referred to the presence of black market for drugs where these are found at cheaper price, hence continuing to be of interest for CAHWs. Centring more in the selection process, the need for women's involvement was repeatedly mentioned as well as the need for

supervision and training of CAHWs. Finally, it was suggested the suppression of NGOs in ASAL areas as they are "undermining the economic viability of CAH systems". Some respondents also insisted on the veterinarians being paid by the government to work in those areas.

- **Impact and sustainability**

Following PM's answers, main reasons for CAHWs to leave their duties were:

Lack of salary or payment	42.9%
Drug kit replenishment and drug availability	42.9%
Disagreements with the community	32.1%
Finding other activities	32.1%
Donor-driven problems	32.1%
Infrastructure	17.9%
Lack of commitment	17.9%
Failure in the selection process	10.7%
Lack of supervision	10.7%
Family matters	7.1%
Lack of good training	7.1%
Institutional support	3.6%
Drunkenness	3.6%

Table 15: Main reasons for CAHWs to leave (policy makers group)

Therefore, incentives stated to encourage CAHWs to remain active were:

Economic (i.e. salary or payment)	71.4%
Social status or recognition by the community and /or government	46.4%
Enhanced amenities (water access, roads and security)	17.8%
Availability and regular supply of drugs	17.8%
Refresher courses	10.7%
Means of transport and equipment	10.7%
In kind presents (e.g. animals) to be given by the community	3.6%

Table 16: Incentives for CAHWs to continue working (policy makers group)

Most (42.8%) of the policy makers interviewed did not know what CAHWs did after leaving the community work. The remainder however suggested few alternatives, the most popular being returning to livestock keeping (46.6%) followed by opening a drug store (referred to as 'duka' or 'agrovet') (33.3%) and going for further training (26.6%). Other suggestions were turning to the black

market becoming an illegal drug seller (20%), migration to towns in search of higher wages, and livestock trade.

Policy makers thought a livestock keeper would be more interested to go to a CAHW instead to another supplier of similar services due mainly to their availability (53.6%) and to the low prices and flexibility of payment methods (46.2%). Other answers were the understanding of the local culture, lack of other alternatives, because of the quality of the drugs, trust, respect, and follow up of the animals.

PM's perceptions of what were the "other suppliers of [similar] services" are stated below:

Black market or illegal drug sellers*	64.3%
Agrovets or dukas (shopkeepers)	53.6%
Government veterinarians	46.4%
Animal health assistants/technicians	46.4%
Traditional healers	21.4%
Livestock keepers and traders	17.8%
Non governmental organisations	14.3%
Human medical professionals and chemists were also mentioned	10.7%
Pharmaceutical industries	7.1%

* Note: Illegal drug sellers and black market do not include, for the purpose of this study, "agrovets" and "dukas" even if it could be argued that they might also be considered as illegal if not supervised by a veterinarian. Illegal drug sellers include quacks and peddlers.

Table 17: Other suppliers of similar services as perceived by policy makers

Black market and illegal drug sellers were considered as a "threat" in 46.4% of the answers as they sell "[bad quality] cheaper drugs", hence increasing drug-selling competition. The issue of "bad quality drugs" was linked to the lack of ethics (a desired quality mentioned in the ranking) of drug sellers as opposed to these of veterinarians or AHAs. Black market competition had different origins as reported by respondents. These could either be from the borders (Somalia,

Southern Sudan etc) or from private veterinarians or government officials buying drugs in Nairobi at cheaper price and re-selling them to quacks. With regard to "agrovets" and "dukas", reference was made to their competitive advantage in selling also human drugs so that it "makes it easier for the livestock keeper to buy there".

Statements were made against CAHWs such as "(CAHWs) are also illegal but they will disappear after the new government because it will enforce the law". Others insisted that "the country can afford health services to livestock and men so that services are available there". It was also suggested the creation of a drug inspectorate for law enforcement. However others thought community workers could be a solution to reduce public health concerns regarding drug residues in milk and meat. One suggested solution was to train these quacks or peddlers so that they sold quality drugs. Supervision and good quality training for CAHWs was commonly agreed.

Proposed solutions from policy makers to counteract the competition problem mainly included:

Educating communities about the concept of "quality"	28.6%
Supervision by veterinarians and/or AHA of CAHWs	28.6%
Creation of a drug inspectorate allowing only veterinarians (private or from the government) to sell drugs	17.9%
Enforcement of the law	14.3%
Enhancing economic or business capacity of CAHWs	14.3%
Liberalisation of the market	7.1%
Training of quacks to become CAHWs	7.1%

Table 18: Policy makers group suggestions on how to increase CAHWs visibility

Other suggestions to solve the competition issue referred to (i) institutional change, (ii) banning government veterinarians from selling drugs, (iii) creation of farmers' organisations, (iv) accreditation of shops through logos, (v) recognition

of CAHWs in the Veterinary Surgeons Act, (vi) registration of "dukas" by the Kenyan Veterinary Board (KVB), and (vii) improve infrastructure. Finally it was suggested that private veterinarians should exclusively work on clinical treatments whereas the government officials should exclusively concentrate on surveillance.

When asked about what kind of support should be given to CAH systems, 67.9% mentioned the government and 57.1% the private veterinarians. Government support focused mainly on "training and retraining" (26.3%) as well as institutional support through recognition and certificates (15.8%). Supervision of the workers was stated in 10.5% of the answers related to government support. Other suggestions were lending money to private veterinarians, to the communities and finally to provide drug supply (5.3% each). Regarding private practitioners' support, it focused mainly on supervision (25%), on drug supply (18.8%) and on "training and retraining" (12.5%). In 10.7% of the cases it was stated the NGO should be supporting the systems but functions were not specified.

Suggestions for CAH system improvement coincided, for 32.1% of the interviewees answers, in a structure whereby CAHWs would be supervised either directly by the veterinarian or by the AHA (who in turn would be supervised by the veterinarian). Veterinarians would then be supplying drugs and training to AHAs and CAHWs. Further comments on the sustainability and effectiveness of CAH systems were raised. They included taking a uniform approach to CAH systems, empowering farmers, improving productivity, enabling access to markets and monitoring of the systems. Few interviewees pointed out concerns

regarding CAH systems in relation to international sanitary and phyto-sanitary standards (SPS) for export of live animals and animal derived products.

Having exposed the results obtained through the questionnaires for LK and PM, the next section details the correlations between these groups in terms of ranking qualities.

5.3.3   Pearson correlations

As stated in section 5.2.3.3, the procedure of obtaining the rankings differed from that of Ruebush's and were based on the proportional voting theory (Stiglitz 2000). Hence weights were given to the first 3 qualities mentioned by the interviewees. The first quality coefficient was 1, 0.6 for the second and 0.3 for the third. These coefficients were multiplied to the times each quality was mentioned. Pearson correlations were performed for each group (livestock keepers and policy makers). Correlations and agreement within and between sub-samples for each group were calculated in order to enable the comparison of each district's perceptions of the first three qualities to those stated by policy makers. First was analysed the sample for livestock keepers and second, the policy makers'. A full account of the results of the Pearson correlation analysis can be obtained from annex 7.

5.3.3.1   Livestock keepers

Correlation between sub-samples of the livestock keeper respondents was calculated in order to explore significant variations within and between districts with regard to the ideal qualities stated (i.e. variations between sub-samples of literate and illiterate respondents and between men and women).

- **Correlation within districts**

    The results of the analysis show significant correlation between sub-samples of literate and illiterate respondents in each district (West Pokot, r = 0.645; Wajir, r = 0.761; and Marsabit, r = 0.833, all with P<0.01). The sample was made up of 10 literate and 10 illiterate respondents randomly selected, for each district. In West Pokot and Marsabit the illiterate group up was made of 5 men and 5 women, in Wajir it was made of 7 men and 3 women, due to the lack of women interviewed in the district. All correlations being significant, aggregation of answers between literate and illiterate male respondents was therefore possible. Concordance, as measured by the average Pearson correlation among respondents in each sub-sample, was however higher within literate (0.573) than within illiterate (0.359) respondents across districts. The lower level of concordance within the illiterate sample might be the reason for obtaining different trends in quality prioritisation, as seen in the semi-structured interview analysis.

    Correlation between men and women within a district was statistically significant in Wajir and Marsabit (r = 0.664 and r = 0.744 with P<0.01). The correlation between men and women subgroups was not statistically significant within West Pokot (r = 0.399) district but following Weller's rationale (1987), was sufficiently high to warrant aggregation (0.602). Samples, for men, were made of 10 literate and 10 illiterate randomly selected men for each district. In the case of women, all women in each district were included in the sample. It must be borne in mind that there was a low level of women participation in Wajir, which might have hindered the results. Concordance between men and women within each district was high (0.602), showing no significant variations in the ranking of the first 3 desired qualities. This confirms the results obtained from the semi-structured

interviews, where the two first qualities mentioned by both sub-groups were "trust" and "commitment". However, minor differences in perceptions and prioritisation of the subsequent qualities were found in the semi-structured interview analysis.

- **Correlation between districts**

Regarding correlation between men across districts, the study sample was made of 10 literate and 10 illiterate men for each district. Marsabit and West Pokot men and Marsabit and Wajir men were significantly correlated (r = 0.460, P<0.05 and r = 0.617, P<0.01 respectively). But West Pokot and Wajir men's correlation was not statistical significance (r = 0.339). However, the coefficient was high enough to warrant aggregation between districts, so concordance between men across districts was of 0.492.

Correlations between subgroups within each district and across districts have so far been analysed. These correlations have mostly been significant or high enough to warrant aggregation. This made it possible to consider each district as a homogeneous sub-sample. Hence, calculating correlations between districts' quality preferences was possible. Samples for this analysis were made of 20 respondents per district, these being: 8 women and 12 men for West Pokot, 3 women and 17 men for Wajir and 10 women and 10 men for Marsabit. (Men samples were randomly selected and were equivalent in the number of literate and illiterate men). Results obtained showed that West Pokot and Wajir were significantly correlated (r = 0.500, P<0.05) as well as Marsabit and Wajir (r = 0.463, P<0.05). However, correlation between West Pokot and Marsabit was not statistically significant (r = 0.165) but, following Weller, high enough to enable aggregation and therefore allowing us to consider the three districts as a single

sample. The overall concordance between districts remained however high (0.376).

These results indicate that there was little variation between livestock keepers' group respondents in terms of preferred ordering of the first three "ideal" qualities of a CAHW. There were no significant variations in the ordering of the first 3 qualities between sub-samples. However, as seen in the analysis of the semi-structured interviews trends could be seen amongst these sub-groups for the subsequent qualities.

5.3.3.2   Policy makers

Correlation between respondents belonging to different groups can be found in annex 7. Ranking methods followed the same pattern as for the LK group.

In relation to quality ranking preferences between those respondents with and without field experience, correlation was significant (r = 0.583) at P<0.01. Little variation could therefore be expected from the quality ranking between these two sub-samples. Hence, field experience did not seem to be an important factor in the quality prioritisation. Differences existed however between interviewees with and without policy involvement. Correlation between these two sub-samples was not statistically significant although relatively high (0.360). More variations could be expected in their ranking priorities. This corroborates the results obtained in the analysis of the semi-structured interviews, where respondents with policy involvement tended to highlight qualities such as "qualified". Those with field experience correlated higher with those having policy involvement

(0.910 with significance level of P<0.01) than with those without policy involvement (r = 0.455).

Agreement level between academics, private sector members, KVA/KVB members and government officials sub-samples in the policy makers group was higher (0.489) than concordance between livestock keepers' subgroups (0.376). It should be noted the high correlation between the private sector and the KVA/KVB members (r = 0.625 with a significance level of P<0.01). This can be explained by the fact that some private sector respondents were also KVA/KVB members. The small number of members in each "group" sub-sample of PM must be taken into account.

5.3.3.3   Policy makers - districts correlations

As expected, correlation between Policy Makers' group and West Pokot and Marsabit districts was not statistically significant (r = 0.358 and r = 0.074 respectively) but was however significant with Wajir (r = 0.760 with P<0.01). Hence, Policy Makers' quality ranking for the first 3 stated qualities of the "ideal" CAHW was not similar to the qualities requested by West Pokot and especially Marsabit members but similar to those of Wajir's. Similarities with the latter case might be due to a greater involvement of chiefs in the interviews, which in turn is a result from the translators' choice of respondents (see annex 5). Qualities mentioned and their priorities in Wajir were therefore comparable to government officials' perceptions of "ideal" qualities.

5.3.4   Weaknesses of the field study

Factors influencing the research arose in the two interviewees groups. In relation to the livestock keepers group and given the nature of the study, which was

highly focused on qualitative data, one of the crucial parts of the field research was the choice of translators. These were selected in each of the districts through the contact NGOs who had been previously briefed about the needs of the research team. Hence, the quality of the translators appointed was dependent on the field NGOs knowledge and the lack of choice (as there were very few locals speaking both English and the local language). Attention was given to the careful explanation of the questionnaires to translators. As mentioned in section 5.2.2, it appeared not to be feasible to undertake the initially planned translation and back translation of each interview in order to check its accuracy. This may have affected the notes taken and hence the results. Nonetheless, the careful explanation of the questionnaire to each translator aimed at reducing the possible interpretation errors.

Besides the accuracy of the local translators while in the community, it is important to highlight both advantages and disadvantages of their backgrounds. In West Pokot and Wajir districts, translators were familiar with the CAH system. This might have biased the notes taken (because of preconceived ideas on CAH systems). In Marsabit however, only one of the translators was familiar with the CAH system. This might have allowed them to have unbiased views during the interview process. Nonetheless, their lack of knowledge of CAH systems may have had repercussions in the interpretation of respondents' answers. In addition, it should however be mentioned that the quality of their translations was lower in terms of written English than with the previous two districts.

Another factor to be highlighted was the difficulty in interviewing women in West Pokot and especially Wajir. Given the small number of women in the samples, the analysis of the data might have been biased as a result of the sample of

women not being sufficiently representative (especial attention to be given to Wajir).

The political climate in all districts was characterised by a certain level of anxiety due to the KANU (Kenya African Nationalist Union) district parliamentary election (November 21st, 2002) and the imminent general election (December 28th, 2002). These factors, in turn, increased the insecurity situation in the study areas, which as mentioned in section 5.1.3, was already a problem. These events influenced the mobility and availability, and probably perceptions of needs in the communities visited. It should also be noted that the period of study in Wajir - mostly a Muslim area- coincided with Ramadan and that some part of West Pokot respondents were affected by some degree of drunkenness.

In relation to the policy makers group, concerns could arise in relation to the "truth" in mentioning the years of both policy and field experience. Given the nature of the subject studied, which was hotly debated in the animal health arena in Kenya during the period of the field research, PM might have "inflated" the answers.

Finally, with regard to data analysis, two factors might have influenced the results obtained. First, it should be noted that it was the principal investigator who performed the analysis. Biases might have occurred due to the lack of another analyst opinion. However, analysis and calculations were performed twice at least in order to limit this effect. Second, the coding of the qualities and themes was dependent to the author's interpretation of the answers of the questionnaires. Obtaining the code categories was facilitated by the structure of

the questionnaire given that respondents had to define each of the stated the qualities.

Having presented the overall results of the data collection, the next section focuses on the discussion of the field research results.

5.4 Discussion

The organisation and discussion of the results will follow the structure previously outlined in chapter 4, section 4.3.6. Thus, the next sections focus on the selection process of CAHWs, and on the impact and sustainability of CAH systems. However, other factors mentioned in the framework outlined in section 4.3 for evaluating CAH systems will inevitably overlap in the discussion section (mainly with access to services, quality of services and financial resources).

5.4.1   Selection process

Two recurrent aspects likely to highly influence the selection of candidates refer first, to the perceived 'ideal' qualities of workers and second, to the influence of local politics in the selection process. These are discussed below.

5.4.1.1   'Ideal' qualities

Several studies dealing with selection of community health workers have attempted to correlate demographic characteristics (education, age, gender etc) of the workers with their performance (Rifkin 1983; Rifkin, Muller and Bichmann 1988; Gagnon 1991). While these characteristics have to be considered when selecting candidates, they might not be as important to the success of the worker as their personality. In this field study, semi-structured interviews with livestock keepers and community members were used to elicit the qualities and

characteristics both groups believed were the most important. Respondents were subsequently asked to rank these qualities in order of importance.

Studies conducted in the human health field relating to CHW have highlighted "trust" as one of the main reasons for systems to be sustainable (Walt, Perera and Heggenhougen 1989; Bennett, Creese and Monasch 1998; Voyle and Simmons 1999). Following the same lines, the present case study highlights "trust" as the most desired quality in workers by community members (see table 19 below). In view of the setting and context of the interviewed communities (such as remoteness, insecurity, lack of infrastructure etc – refer to section 5.1.3 for more details) it is not difficult to understand why respondents mentioned in addition to "trust" other qualities such as commitment and responsibility. Similar qualities have also been put forward by community members in other CAH projects and geographical locations such as Peru (CARE-Peru 2001) and Ghana (Hanks, Oakeley, Opoku et al. 1999).

Rank	QUALITY – PM GROUP	QUALITY – LK GROUP
1	Literate Trainable/Knowledgeable	Trustworthy
2	Ethnic to/ knowledge of the area	Committed
3	Trustworthy	Responsible
4	Available	Knowledgeable
5	Commitment	Literate
6	Owning livestock	Mobile
7	Social person	Social person
8	Qualified Community generated Mobile	Available
9	Ethical Interface	Owning livestock
10	Knowledge on ethnoveterinary medicine	Polite

Table 19: Quality ranks for PM and LK groups

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As seen in table 19, a gap exists between the desires and demands of the ultimate consumers of the services, the livestock keepers in pastoral areas, and the perceptions of the policy makers, being the ones to set the legal framework for the criteria of candidate selection. This gap was also put forward through the Pearson correlation analysis (in section 5.3.3).

It appears that there is a higher agreement in relation to the ideal qualities of CAHWs among policy makers than among districts. Taking into account that the curriculum of CAHWs has recently been debated and drafted by the Kenyan Veterinary Board (KVB) members (The-IDL-Group 2003), it seems logical that policy makers tended to have more similar opinions concerning CAHWs qualities. Lower agreement among livestock keepers in the three districts might be due in part to the existing geographical and cultural differences. But special attention should be drawn towards the CAH project organisational plan, which although "business-oriented" in all three settings, greatly differed between districts, hence might have influenced the needs and perceptions of the "ideal" CAHW. Given the business orientation of such systems, it is useful to examine them through a Williamsonian lens.

Yet, Williamson's analysis of 'trust' (1996) in the context of transaction economics (see section 2.2.5) and governance (see section 3.3.3) applied to AH systems is of special relevance for this field study. He classifies trust into three categories, namely (i) calculative trust, (ii) hyphenated trust, and (iii) nearly non-calculative trust.

In relation to the first category, he considers trust as a risk. He therefore quotes Dasgupta who pointed out that "for trust to be developed between individuals

they must have repeated encounters, and they must have some memory of previous experiences. Moreover, for honesty to have potency as a concept there must be some *cost* involved in honest behavior. And finally, trust is linked to reputation, and reputation has to be acquired"[32] (Dasgpupta 1988, in Williamson 1996). Hence, as put by Williamson, "risk entails exposure to probabilistic outcomes"[33]. Risk can thus be calculated by taking into account the following variables: (i) the "range of possible outcomes and their associated probabilities", (ii) the "cost-effective actions" that need to be taken in order to "mitigate hazards and enhance benefits", (iii) proceeding with the transaction "only when expected net gains can be projected", and (iv) when the largest net gain is projected on the second party involved in the transaction.

Hence, taking Williamson's analytical approach to trust and transaction situations in a CAH system context where a pastoralist (P) and a CAHW (C) are transacting an output (O) (e.g. a service such as vaccination etc), the probabilistic equation could be summarised as it follows: $O = qP + (1-q)C$ (given the Agency implications in such setting argued in section 3.2.2), where q is the probability of a good outcome (i.e. that the transaction is made).

k=0   A   s=0   B   k>0   s>0   C

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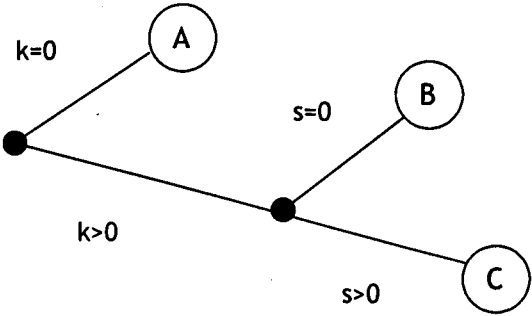
[32] Page 259.
[33] Page 259.

	p = price	k = hazard	s = safeguards
Node A	P1	0	0
Node B	P2	K2	0
Node C	P3	K3	S3

Figure 11: Simple contract representation (adapted from Williamson 1996)

Following Williamson's rationale, node A does not imply any hazards so that goods or services are swiftly provided and paid for. In that case trust is not involved in the transaction. Node B, however, involves contractual hazards (k). With the buyer not providing a safeguard (s=0), the break-even price is p2. In Williamson's words, this scenario is considered as a 'low-trust' one. Node C does also involve hazard (k3) but is backed up by a safeguard (s3). Break-even price in that case is p3, which will logically be smaller than p2. Here the transaction is therefore classified as a 'high-trust' one.

Regarding the second category, 'hyphenated trust', Williamson regards human behavioural patterns as being embedded in the environment where actors perform transactions. Thus, "socialization and social approvals and sanctions are also pertinent"[34]. Trading hazards are hence dependent not only on the risk borne by the transaction itself, but also on the trading environment in which the transaction takes place. In the case of CAH systems, no legal enforceable context exists (yet). However, as with the example of diamond dealers provided by Williamson (1996)[35], societal sanctioning provides a framework to check on opportunistic behaviour. However, he also argues that such type of sanctioning may have negative effects over the efficacy of contract because it prevents "strategic behaviour", bribery is common so that "court enforcement is

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[34] Page 267.
[35] Page 263.

problematic", and "individuals feel slight remorse when they behave in opportunistic ways"[36].

Finally, 'nearly non-calculative trust' or 'personal trust' is viewed by Williamson as the absence of calculativeness in actors performing a transaction. Nonetheless, he pursues saying that "if however, the decision to suppress calculativeness is itself purposive and calculative, then the true absence of calculativeness is rare if not nonexistent"[37]. He characterises personal trust by (i) the "absence of monitoring", (ii) having "favourable or forgiving predilections", and (iii) "discreetness"[38] (Williamson 1996).

Given the setting were CAH systems exist, one might be inclined to think that trust as perceived by community members would fall into the third category, 'nearly non-calculative' or 'personal' trust. However, Williamson's trust classification is especially interesting when associated with that of 'governance structures' (Williamson 1981) (i.e. 'internal spot market', 'primitive team', 'obligational market', 'relational team') under the governance of PAHC. Indeed, the analysis in section 4.4.3 showed that CAH systems tend to be structured, following Williamson's categorisation, as 'primitive teams'. When linking such classification to that referring to contract law mechanisms (Williamson 1979) in section 3.3.3 (i.e. classical, neoclassical, and relational), where CAH systems in pastoral areas were classified as a 'relational' contract type, it seems logical to think of the quality most mentioned by community members, 'trust', as 'calculative trust', thus viewing trust as risk and not as 'personal or non-calculative trust'.

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[36] Page 268.
[37] Page 272.
[38] Page 273.

Indeed, it is even more meaningful when taking into account the economic motivations behind the origins of CAH systems and PAHC elaborated in section 4.2.1. It is whether the CAH system and the actors involved fall into node B or node C that would affect more or less the sustainability of the CAH system (i.e. with low-trust (B) the system is likely to be unsustainable, whereas with high-trust (C) the system is likely to be more sustainable). In addition, the environment where these transactions take place has no legal sanction mechanism and is therefore based on societal sanctioning as stated above. This, as already argued, might have detrimental effects over the effectiveness of the contract between CAHWs and villagers.

Moving away from the debate over trust, it can be concluded from the results of the field collection that PM highlighted technical qualities whereas LK valued personal characteristics of the candidates. This is similar to Ruebush's findings. Hence, sustainability of CAH systems might be undermined if community members' desired qualities are not taken into account. In that case, although technical qualities are needed to perform the community health work, community members might still not accept workers if personal characteristics are not taken into account for the Williamsonian reasons above explored. Policy makers quality preferences related mostly to "literacy", "knowledge/training on animal health" and on "ethnicity". These preferences point out the wide gap between communities and policy makers' wills in terms of qualities. This is of most importance given that they are the ones influencing policy and legislation in relation to community animal health. If CAHWs' qualities and guidelines for selection are given exclusively following policy makers desires, it will not be surprising to observe a failure in the CAH systems sustainability.

Turning to LK desired qualities, "trust" and "commitment" remained the most desired ones for both men and women, whereas "availability" was ranked 8th (ranked 1st in Ruebush's). Different priorities were however given by both sub-groups in relation to the subsequent qualities mentioned. Deriving from the results, women preferred "personal" qualities in contrast to the more "practical" ones required by men. This brings forward an important issue, which relates to the way information is transmitted to community members by CAHWs. Given that women are "with the animals most of the time", the interaction between CAHWs and women is a key element in the planning of a CAH system. However, given women's low recognition among most of the visited communities, their interaction with (especially) men CAHW might be severely hindered. Hence, this might be one of the reasons why women tend to seek advice from their neighbours or relatives, a finding that has also been pointed out in other studies (e.g. GI-LSP 2003). This behaviour might have repercussions in terms of information asymmetry, which as argued in section 2.2.5, is one of the prevailing market failures in the rural and remote settings.

However, the way in which the CAHW candidates are selected may influence the sustainability of the system.

5.4.1.2   Influence of local politics

It is often mentioned, both in human and animal health, that influential community members such as elders, wealthier community members, clans or 'kinships' are likely to lead to an unfair selection of workers (Ruebush_II, Weller and Klein 1994; IFAD 2004).

The results of the field research point out that the experiences from PM did not differ from the answers of LK with regard to the way the selection of workers was performed. It was markedly noted that, in most of the cases, elders or opinion leaders and occasionally the authorities were those involved in the selection of the candidates.

Their involvement in such process has been largely debated in the human health literature concerning community health workers. As mentioned by Twumasi, "when a new idea [community-based health systems] is introduced into a local community it should not be taken for granted that the idea will be readily absorbed by the local system. The structure of local politics and interests need to be taken into account. Traditional power holders are concerned with changes occurring in their communities and are naturally concerned whether the new idea will threaten their position or will erode their power" (Twumasi and Freund 1985). This conclusion was based on a study in Zambia on the selection process of community health workers and referred to the finding that "[...] the councilor [in Luampungu] regarded the CHW's role as a potentially powerful one and was evident in his attempts to manage and manipulate the initial selection process. Soon after the District PHC Coordinator asked the Luampungu villagers to select people to be trained as CHWs, the councilor subverted the normal community decision process and submitted a list of 12 people who, it was later discovered, were all his close kinsmen" (Twumasi and Freund 1985).

Other studies in different countries have recorded similar problems in relation to the existing conflict between local politics and the selection of community-based health workers (as for example in Java (Williams and Satoto 1983), India (Bose

1983) and Brazil (Macedo and Vieira 1983)). The conflict highlighted in Twumasi's study in Zambia resulted mainly from the fact that the CHW's role was new and had not been properly institutionalised and legitimised by the local power structure. The specific conflict areas centered around three issues, all related to political power, namely the authority to establish a "village health committee", the control of resources (i.e. drugs), and the perceived political threat of the CHW (Twumasi and Freund 1985). Most of the aforementioned findings follow the same lines of the situation encountered in the three Kenyan districts studied for this research as stated by LKs' answers. Therefore, in order to improve the selection process and increase its "fairness", opinion leaders and authorities should limit their involvement.

Additionally, community members suggested that clear guidelines were needed. Such guidelines referred to, not only the qualities required, but most importantly to the procedures that needed to be followed during the selection process. Clearly stating such procedures, as well as making them available to all community members would help limiting interference from village elders or opinion leaders in the community.

Nevertheless, it is interesting to observe that there was a high level of concordance between PM on how CAH systems should be modelled in order to increase sustainability and quality of services. This structure is described below.

5.4.2   Impact and sustainability

Since the start of CAH systems in Kenya, concerns regarding their sustainability have been raised. Lately, new perspectives taken in the planning process have

been focusing on the sustainability of the systems, as when the NGO pulls out CAHWs tend to drop out.

The analysis of the semi-structured interviews shows that both respondent groups mentioned two main reasons for the workers to leave, hence undermining system's sustainability. These were (i) lack of salary or profits and (ii) drug availability. These findings follow the lines of Holden's study in 1997 (Holden 1997).

As debated in section 4.4.2 (i.e. monitoring models and CAHW's behaviour), these two reasons for system failure are closely related to the structure of the system as well as to the monitoring models applied (i.e. perceived rewards and feedback). Therefore, the discussion that follows is organised along the lines of the framework outlined in sections 4.4.2.1 and 4.4.2.2. Such framework needs first to be adapted to the Kenyan CAH context.

5.4.2.1   CAH system model in Kenya

Results from the semi-structured interviews performed with PM revealed that there was agreement on a basic structure for CAH systems. The organisational structure conceptualised by PM regarding CAH systems follows the same principles stated in section 4.4.2 regarding CAH models.

Thus, PM argued CAH systems should be organised through a structure whereby the CAHW is linked either directly or indirectly, through an AHA, to the veterinarian (private or government). It was argued by PM that such model would ensure supervision, monitoring and supply of quality drugs to CAHWs in arid and

semi-arid lands (ASAL) where veterinarians are generally not willing to work. On the theoretical level, PM stated that supervision and monitoring would ensure quality services (in terms of technical skills and drug supply) and a more accurate knowledge of the (animal) disease status of these areas.

These findings therefore show the willingness of policy makers to create a consistent CAH system. In addition to the aforementioned set of specific selection criteria and process guidelines, such model could provide the basic structure for a nation wide system of community animal health. This is stated in the recently created curriculum for CAHWs in Kenya (KVB 2003).

However, the CAH systems targeted in the field study were those including in their planning process an exit strategy, thus labelled as "business oriented" CAH systems. The term 'exit strategy' refers to the sustainability component, not only in terms of economic viability, but especially financial sustainability (as referred to in section 4.3.5). These aspects are highly intertwined with the monitoring system as previously outlined. Hence, the Kenyan CAH systems reviewed during the fieldwork are discussed following the framework exposed in section 4.4.2.

5.4.2.2 System monitoring

Community-based workers' motivation and work performance in pastoral settings may be affected by a complex set of factors. These include individual capabilities and skills, the need for growth, rewards and feedback associated and the work environment. As outlined in section 4.4.2, the work environment for CAHWs is the community and not a facility where the worker is in daily contact

with the AHS. Indeed, CAHWs spend most of their time in the community relating to clients (in their own homes or villages).

Rewards perceived by CAHWs will therefore be highly entangled with those of the members of the local community, that is, those to whom the CAHW provides services. Following Robinson's framework (see section 4.4.2.1), *intrinsic rewards* such as social status or recognition would be an important motivation for the community worker. Indeed, results from the semi-structured interviews show that PM considered "social status" or "government recognition" the second incentive (after the economic incentive, discussed below) for CAHWs to continue working (46.4%). Similarly, LK answers tended to put forward "accreditation" as a means to recognise the training received by CAHWs, thus also relating to social status differentiation.

Nevertheless, *extrinsic rewards* were given more importance in terms of criteria undermining the system's long-term financial sustainability. Extrinsic rewards mostly referred to economic incentives such as salary, payments in kind, or increased amenities. These answers were put forward by both respondent groups. In particular, lack of earnings was considered the first reason why CAHWs tended to leave their community work activities.

It is however important to link these findings to the suggestions of LK. Results from the questionnaires show that the LK group in each of the three districts mentioned that an incentive for CAHWs to continue working would be that they receive a salary from the government, an NGO or a combination of both. Such statements have the implicit meaning that service users are not expecting to pay for the services received. This is corroborated by results of PM questionnaires

were lack of payment by service users (i.e. livestock keepers) was mentioned as a reason for CAH system failure. In effect, most of the community members and livestock keepers' suggestions on how to improve the system (as seen from the results) related to passive reception of goods or services. Such lack of pro-active behaviour by service end users may have important implications for the financial sustainability of CAH systems. Especially given that the areas covered during the field research targeted "business oriented" CAH initiatives.

The lack of pro-active behaviour of service users may have several origins. However, in the context of pastoral Kenya, it may well relate to the fact that during the colonial period most services (including animal health) were publicly provided and delivered through government structures. This does not mean that previously the system was neither more efficient nor more effective than the newly implemented market-based perspective. Nonetheless it gave community members an incentive to behave as passive recipients of services, given that services were expected to be free of charge.

A similar passive behavioural pattern from service recipients can be found in the literature, mostly in relation to transition countries in eastern Europe (Saltman 1998). Although settings and political contexts greatly differ, the common feature is the fact of relying on government as a supreme structure looking after its citizens needs. This led to an increasingly passive consumer behaviour limiting or undermining market liberalisation. In order to obtain sustainable market oriented CAH systems, community members should have a pro-active behaviour.

Still under the umbrella of extrinsic rewards, delayed payment was also put forward by LK and PM as an important cause for economic viability failure.

Indeed, even when service end users are willing to pay for CAHWs' services, they might not have the ATP. This finding links to the debate elaborated in chapter 2, section 2.4 regarding public provision of private goods, and the equity section (4.3.1) in chapter 4. Delayed payment, and to some extent payment in kind, have the consequence of disrupting the cash flow of CAH systems, which, as outlined in section 4.3.5, is mainly based on the margins earned through drug selling. In addition, the physical lack of drugs was also recognised as one of the reasons for system failure. Similar problems have also been put forward in the human health literature (see for example Abel-Smith and Rawal 1992). This is debated later in this section under "instrumental feedback".

Indeed, when relating to the market failures outlined in section 2.2.5, it could be argued that in the context of Kenyan pastoral areas most of these are present. Especially, if AH services are available, they are delivered by one service provider, hence incurring monopoly. In addition, market forces function only when there is enough aggregated demand. It could be claimed that given the remoteness of these locations and the nomadic nature of its inhabitants, it is difficult to attain enough demand. Such market failures were distinctively more prominent in Wajir and especially Marsabit districts. West Pokot, probably due to its geographical characteristics and smaller dimension of the district, was more economically active than the two other visited locations (see annex 4 where districts are described). In addition, lack of basic infrastructure such as roads and the high level of insecurity work against the establishment of a market economy in these areas.

When turning to the feedback component of monitoring systems, as mentioned in section 4.4.2.2 two factors may influence the sustainability of the CAH system. These are human feedback and instrumental feedback.

First, *human feedback*, in terms of CAHW supervision, is essential not only for the workers' motivation, but also, and most importantly, for improving quality of services provided. Indeed, results show that both groups (but especially LK) highlighted "supervision" and "refresher or training courses" in their responses. Although answers are similar between groups, the underlying reasons for bringing forward the topic may have different origins.

On the one hand, PM may well consider supervision important, as it would give a means for them to exert their power over technical staff. Following this argument, the debate and contradictory opinions amongst PM regarding the tasks CAHWs should perform would corroborate these lines of reasoning. Hence, results show that some PM argued CAHWs should only focus on disease surveillance (preventive medicine in general) and reporting, leaving clinical treatments to "qualified personnel" such as AHAs or veterinarians. Thus, clinical treatments are still perceived as the main source of income for the veterinarian. This debate has also been put forward in the human health literature at the beginning of the implementation of community-based health programmes in the early 1980s. Findings such as "the paramedical staff kept a distance from the CHW programme" (Sauerborn, Nougtara and Diesfeld 1989) have been pointed out in the human health literature. In addition, Nichter (1986) and Chabot and Bremmers (1988) have also reported conflicting interests of nurses and doctors with the emerging roles of CHWs. The lack of referral between nurses and CHWs

has been generally used as an indicator of this role conflict in the human health field.

On the other hand, LK did also put forward the need to increase the number and/or frequency of refresher courses for CAHWs. Understandably, such demand may be related to improving the quality and variety of services provided to community members. However, it could be argued that, given that CAHWs derive their earnings from drug selling and provision of services, by improving their knowledge they could increase the services provided, assuming that community members would have enough ATP and WTP. Hence, CAHWs' earnings would rise. Such economic benefits may motivate the community worker to become more independent vis-à-vis the monitoring system and may give rise to opportunistic behaviour.

This behaviour is closely linked to Arrow's agency theory mentioned in section 3.2.2. Hence, attention should be drawn to the power relationships existing within the system and how they could affect animal and public health outcomes. The relation existing between healthcare service providers and the client in the private sector setting whereby the client pays a fee to the private provider for a specific service has been extensively analysed in the literature (Arrow 1985). In market-based CAH systems, the private provider is the CAHW and the client is the livestock keeper. Given the information asymmetry existing between the client and the animal healthcare provider, the latter (especially in a private sector setting) is interested in increasing his/her earnings (as it is their source of livelihood). Two main consequences derive from this behaviour. First, giving information on preventive medicine to clients (livestock keepers) contradicts CAHWs economic interests, as there will have less cases of disease. Thus there is

no economic reward for CAHWs to improve this specific service. Second, following a similar reasoning, public health extension does not translate into economic benefits. Thus, should these components of the CAHW curriculum be strengthened, more attention should be drawn towards the aforementioned intrinsic rewards.

Hiding information in order to provide excessive treatment is referred to in the literature as provider moral hazard if it is not legal or permitted (debated in section 2.2.5). The latter is therefore highly intertwined with the funding sources, as debated in chapter 3. Moral hazard in the case of animal diseases exclusively, may have only economic consequences, thought they might be high enough to bring the attention of the national and international community (e.g. FMD outbreak). Nevertheless, provider moral hazard in community-based systems may have important public health implications should the disease be of zoonotic nature. This has been the case lately in some Asian countries with AI, namely Thailand, Vietnam and Cambodia.

Second, *instrumental feedback*, as mentioned in section 4.4.2.2, refers mainly to drug supply. Results obtained from the semi-structured interviews point out that both respondent groups were concerned with the availability and quality of drugs provided and, closely related, the existence of black markets in the study areas.

These same points have already been put forward in the human health literature. Thus, PM raised concerns about the existence of (drug) black market in these areas qualifying it a "threat" to CAH systems. In the human health field, Sringernyuang, Hongvivatana and Pradabmuk (1995) pointed out that the

"abundance and easy availability of drugs in the villages constitutes an extremely unsuitable environment for the enhancement of appropriate drug use by consumers". Although contexts are different, it could be argued that public health implications of drugs misuse may translate into, for example, human antibiotic resistance (e.g. through antibiotic residues in meat or milk products). In addition, semi-structured interviews pointed out that community members had limited knowledge on the use of drugs. As a consequence, veterinary drugs were reported to be used in the human context (one of the interviewees mentioned animal "eye droplets"[39] used in the human context).

Solutions proposed within the PM group in order to overcome the drug quality and monitoring problem seemed however fairly opposed. On the one hand, it was mentioned that the problem could be solved by creating a drug inspectorate and by enforcing the law. On the other hand, proposals such as liberalisation of the market to create more competition to enhance the effectiveness of the system were suggested. Following these lines, community members saw a competitive advantage in these quacks or illegal drug sellers. Hence community members suggested quacks should be trained to become CAHWs as they already have their drug supplier network, thus making the system more likely to be sustainable. Experiences in other African countries, especially in francophone Africa, corroborate this opinion (Saleh and Mamis 1999). Arguably, however, free market competition is not always synonymous of enhanced effectiveness (Stiglitz 2000) as mentioned in the economic analysis chapter. This holds especially true when public health consequences derive from drug misuse in both sectors.

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[39] Wilson Chekeruk, personal communication, 2002 (Sigor, West Pokot, Kenya).

The findings show the important gap existing especially within the policy makers group. This relates not only to the proposed solutions for reducing black market presence in those areas, but also to the advantages illegal drug sellers could represent for the system's sustainability (as mentioned by community members). Different opinions within the same group illustrate the controversy surrounding CAH systems in the Kenyan context. Such disagreements and reluctance of some members of the veterinary profession are similar to those recorded in the human health sector as mentioned in section 4.4.1.

However, it is also important to note that most respondents in the PM group raised concerns regarding the role of CAH systems within the Kenyan animal health structure. They especially pointed out concerns about the implications such systems might have in terms of international or regional trade in livestock and derived products under the context of WTO sanitary and phyto-sanitary (SPS) standards. Concerns regarding the SPS agreement and the livestock sector will be debated in the discussion chapter (section 6.2.4).

Having discussed the results of the Kenyan case study in terms of selection process and sustainability of CAH systems, the next section brings forward the conclusions of the field data collection.

5.5   Conclusions

This chapter has analysed the human resource component of community-based delivery systems in the AH field. The analysis was based on a field research performed in Kenyan arid and semi-arid lands. The research methodology followed the lines of a previous study in the human health sector on community malaria workers in Guatemala. The aims were to compare the opinions of

community members and policy makers regarding the perceived "ideal" qualities of community based animal health workers and to explore the factors influencing CAH systems sustainability.

The results have shown that important similarities exist between human and animal health settings with regard to the perceived "ideal" qualities of community workers. Hence, "trust" appears to be the most desired quality by community members when selecting CAHW candidates. The meaning of "trust" has been debated following Williamson's rationale and it has been concluded that it is the calculative type of trust. The implications of calculative trust have been pointed out in the context of CAH systems performance.

Sustainability of CAH systems has been analysed following the framework elaborated in section 4.4.2. The types of incentives and rewards embedded in CAH systems have been brought forward. For community-based systems to be sustainable, the desires of communities need to be taken into account. Hence, selection procedures are also important when targeting sustainability. Defining clear guidelines is seen as essential for the fairness of the process. In addition, interference with the selection process from elders of community leaders should be avoided.

It needs to be pointed out that the field research shed light over a crucial area in the animal health arena. This relates to role of the quality and availability of animal health goods, in that case drugs. Thus, although all the aspects analysed during the field research are crucial to the functioning of community-based systems, these two qualities were reiteratively pointed out as problems during the questionnaires in the rural communities.

The next chapter will discuss the policy implications associated to the findings in the previous sections. It will also draw the conclusions and recommendations of the thesis.

6 Discussions and conclusions

6.1 Introduction

6.1.1 Background

Building on the analysis performed in previous sections, this chapter debates the policy and development implications associated to animal health. It puts AHS within a broader context and discusses the rationale behind focusing on animal health. Under the public health umbrella, animal health systems, their role and whether and how they could be financed are examined following Pearce's environmental economics lens. In order to facilitate the flow of this discussion chapter, a synthesis of each of the previous chapters is provided. In addition, each of the objectives of the thesis is matched to discussion sections 6.2, 6.3 and 6.4.

The first objective of the thesis, which was to demonstrate the usefulness of applying a new perspective in the economic analysis of animal health systems, has been addressed in chapter 2. The chapter describes the economic rationale used by international institutions such as the World Bank and the International Monetary Fund during the structural adjustment programme undertaken in SSA, and how it affected AHS. The analysis shows that the standpoint taken for SAP followed Samuelson's rivalry and excludability principles. Countries proceeded to privatise those AH services and activities deemed private under Samuelson's classification of goods and services. However, not enough attention was given to the existence of market failures in the AH market, especially in rural and remote

contexts. Yet, the literature suggests that the outcome of SAP has not reached the expected effectiveness and efficiency improvements in the delivery of AHS. It is especially the case in pastoral areas. Indeed, following Stiglitz's arguments, market failure seems to be complete in rural and remote areas. Hence, there is a rationale for government intervention. However, it has also been argued in the literature (e.g. Stiglitz) that public failure exists. This is discussed later in this chapter in section 6.2 in relation to AHS. The debate takes a public choice approach pointing out that government failure in combination with SAP have contributed to the weakening of AHS in most developing countries.

At the same time as AHS are deteriorating, there is a trend towards increased animal production, particularly in developing countries. IFPRI estimates have shown that meat and milk production in 2020 will be 40% and 60% higher, respectively, that in the 1990s. This trend is particularly acute in Asia. The public health consequences are currently increasing because of the spread of zoonotic and emerging diseases associated to increased animal production (e.g. AI and SARS). Consequently, the need to strengthen these AH structures has been stressed. One way of attaining this is through increasing their financial resources, cut back by adjustment programmes. The second objective of the thesis is discussed in chapter 3 that describes the existing structures and components of AHS, as well as their associated funding mechanisms. The chapter draws on Musgrave's public finance theory. Additionally, the chapter includes the results obtained from a thorough review of the scarce literature in the animal health sector and a questionnaire administered in Senegal. A comparison with human health system's organisation and funding strategies is elaborated through Murray and Frenk's definition of 'health action'. Whereas AHS in developed countries tend to be organised as a separate authority from governmental structures

although closely linked, developing countries' AHS are articulated within the ministry of agriculture or the ministry of health. The chapter points out that emerging and re-emerging zoonotic diseases are difficult matters to tackle as they lie between the agricultural and health sectors (e.g. BSE in the UK). Generally, weak linkages exist between the ministries of agriculture or livestock, ministry of health and, most importantly, with the ministry of finance. Consequently, little attention is given to such diseases, which in most cases are preventable. Emphasis is thus given to Williamson's theories of governance related to delivery and funding. In the current chapter (6) the financing debate is brought forward to find options on how to cope financially with such diseases at supranational level. A discussion over financing for animal health funds is elaborated in section 6.3, where four options are debated, namely (i) risk and private sector finance, (ii) modifying the flow of private funds, (iii) financial incentives for private sector financing, and (iv) market creation and regulation (see below in sections 6.3.1, 6.3.2, 6.3.3, 6.3.4).

The third objective of the thesis focuses on AH service delivery mechanisms and is explored in chapter 4. Community-based systems were chosen as an example of AH schemes given the similarities with the human health counterpart. This chapter describes and compares the different origins of community-based human and animal health systems. It points out that PHC was driven by international concern about diminishing resources and the concept of "health as a right". Conversely, in the animal health counterpart, the increase in CAH systems that led to the creation of the PAHC approach was driven by economic forces. The lack of institutional framework in which CAH systems have burgeoned from the 1970s contrasts with the apparent top-down institutional approach of most community-based health structures implemented under the PHC initiative during

the same time period. The two systems (animal and human) seem however to converge. Economic forces (such as the SPS agreement) point out the necessity of an institutional framework where CAH systems would be linked to a national structure. Conversely, financial sustainability issues have put into question the top-down approach to PHC. Given the economic-driven need for integrating CAH systems into a wider national animal health structure, a framework is developed in order to guide their scaling up. Equity, efficiency, access, quality of services, and financial and human resources are debated in this chapter with regard to CAH systems. However, the last of the criteria, human resources, is more extensively elaborated in chapter 5, hence addressing the fourth objective of the thesis.

6.1.2 Organisation of the chapter

In section 6.2, Stiglitz's framework of analysis is again used such as in chapter 2 section 2.2.5, but this time to analyse public failure, that is the reasons why certain decisions at governmental level are not taken up when they are seemingly welfare maximising. Section 6.3 recalls chapter 3 and debates the funding opportunities at international level to cope with transboundary animal diseases. This section follows Pearce's rationale in environmental economics. Section 6.4, while linking to chapters 4 and 5, brings together the need for bridging national and community -based strategies. Finally section 6.5 presents the conclusions of the thesis and the research needs in the area.

6.2 Public failure as a cause for increasing public health threats from animal origin

As outlined in the introduction section (1.1) Schatz stated that it is a "basic misconception that Africa's economic stagnation is poor government performance". Following the lines of the debate in section 2.4, "development requires reform rather than rejection of states' efforts to improve upon the functioning of the free market" (Schatz 1996). Schatz stated that "perhaps a cumulative process will occur. If modest improvements could be achieved in genuine development assistance programmes, this might enhance the influence of productive entrepreneurs, who would in turn support those persisting forces that favour constructive government intervention" (Schatz 1996). Along those lines, Helleiner (1992) pointed out that "in [...] Africa, where critical early investments must be undertaken by government (in education, health and infrastructure), where confidence in government has been shattered and where much of the relevant private decision making is done by peasant farmers, the first step has normally been to restore some public investment, generate some early growth, and restore some government credibility" (Helleiner 1992). Not only this quote points out the need for government support but most importantly it puts farmers at the centre of the decision making process. As opposed to the New Classical Economics school, the New Keynesians Economics searches to adapt micro theory to macro theory (Greenwald and Stiglitz 1987). Adapting to the rural setting this would mean linking farmers in rural areas to the national economy. Indeed, Stiglitz emphasises that "focus should be given to microeconomics in developing countries" and to the theory of rural as well as industrial organisation (Stiglitz 1989).

It logically follows that one major element of this school of thought is the study of imperfect information and incomplete markets (Greenwald and Stiglitz 1987). Still linking to the debate in section 2.4, Greenwald and Stiglitz pointed out that "while new and old Keynesians would disagree upon the exact form of their policy recommendations, they would agree generally that government intervention is at least sometimes (many would argue frequently) desirable to stabilize the level of economic activity" (Greenwald and Stiglitz 1993).

However, although government intervention is desirable to a certain extent, it is difficult to understand why those measures taken to overcome market failures are not as effective as they should be. This links to the debate elaborated in chapter 2 section 2.2.4 regarding the public choice perspective of the thesis.

Following Wiseman's (1960) lines, Stiglitz (1989, 2002) criticises Musgrave's (1959) approach to those failures arising within government structures. As mentioned by Wiseman "at the analytical level, Musgrave seems to identify 'democracy' with 'maximization of economic welfare' in the technical case" (Wiseman 1960). However, "not all economists will be as willing as Musgrave to accept that welfare economics can provide unambiguous guidance for public policy. The development of the second-best propositions has made clear the general vulnerability of policy statements derived from welfare analysis" (Stern 2002).

Along those lines, Stiglitz debates the limitations of the market failure approach when addressing government structures (Stiglitz 2002). Using Stiglitz's words, "it is now recognized that market failures are pervasive — markets do not result in (constrained) Pareto efficient outcomes whenever markets are incomplete or

information is imperfect, that is, *always"* (Stiglitz 2000) (emphasis by the original author). There is therefore not enough information for governments to be guided in their decisions on how to intervene. This has been pointed out in the environmental economics arena (Pearce 1995) and holds especially true for AHS in the case of transboundary animal diseases such as AI (with public health and economics implications) or FMD (with economic implications). The limitations are: (i) "government failures", and (ii) not adopting "seemingly Pareto improving reforms". These will be debated within the context of animal health and zoonotic disease spread. The justification is based on the similarities drawn in section 4.3.2.2 between transboundary air pollution and transboundary animal diseases, which include zoonotic diseases.

6.2.1 Government failures

Market failures have been extensively analyzed in several disciplines and have been applied to the AHS in section 2.2.5. However, "much of the analysis of public failures remains at an unsophisticated level" (Stiglitz 2002). Some debate over public failures has already been pointed out in section 2.2.4. Adding to that debate, advances have been made in the understanding of the need for collective action for example in order to cope with the free rider problem. This refers back to the analysis elaborated on the classification of goods in section 2.3.1. Examples in the AHS would include vaccination campaigns (whereby the farmer decides not to vaccinate due to the positive externalities arising from neighbouring farmers vaccinating their herds) or compulsory slaughter compensation (where when there is no accurate census of the number of animals held by farmers, these are likely to inflate the real number in order to receive higher compensation, as happened in Vietnam during the AI outbreak). However, Pearce's rationale in environmental economics is useful when talking about

transboundary problems. He mentions that one of the economic failures causing environmental loss is the "global appropriation failure" (Pearce 1995). What he highlights is the existence of missing markets in the environmental arena. The same has been pointed out in section 2.2.5 in the case of AH markets. No obvious mechanism exists to capture the value of functions such as the control of transboundary animal diseases (although CBAs have already been debated in sections 2.3.1.2, 4.3.2.2 and 4.3.5.1).

Nonetheless, if governments have to tackle such situations they should be given powers that need to be bigger than that of private organisations or individuals. An example is the collection an earmarked tax to finance the compensation scheme to control AI in Vietnam (Riviere-Cinnamond 2005) (other examples would include the schemes exposed in section 3.4.3). At the same time, actions need to be taken to control such power governments might have, so that they do not incur abuse (e.g. misuse or corruption). However, these constraints may also in turn limit governments' span of action. In addition, a particular feature of governments is that when they enforce contracts with private parties, they cannot ensure that commitment will continue when the next government comes into power.

Finally, following Stiglitz's reasoning, "public failures may be a consequence of inherent limitations of government" nonetheless, there is still scope for some degree of rectification. Such rectification may take the form of increased competition through quasi-market based mechanisms. Examples of such mechanisms applied in the AHS have been described in section 3.4. Nevertheless, at the extreme of increased competition is the privatisation of certain public sector activities. Following Laffont "privatization of public firms creates an

asymmetry of information between the political power and the firm which makes more difficult the pursuit of those private agendas [within public structures] and which can then benefit citizens" (Laffont 2002). However, "the conditions under which privatisation adequately resolves problems of public interest are closely parallel to those of the fundamental theorems of welfare economics, e.g. no externalities, complete markets, and perfect information" (Stiglitz 2002). Stiglitz, though, insists on the need to continue searching for methods to improve performance within the public sector on both theoretical and practical grounds (Stiglitz 2002).

6.2.2 Adoption of Pareto improving reforms

It has already been shown that governments sometimes do not adopt reforms that are "seemingly Pareto improving" (Stiglitz 1998). One of the reasons appears to be the presence of interest groups at governmental level that affect the long run prospects of reforms. Examples where these interest groups have exerted power have already been pointed out in the thesis (see the debate over regulatory capture in sections 2.2.4, 2.3.1.2, 3.3.2 and 3.4.3.3). In addition, when analysing the case of community-based service delivery in both human and animal health, it has been shown that medical and veterinary professionals have tended to be reluctant to accept community workers (see sections 4.4.1 and 5.4.2.2). Along those lines but at another level, the debate surrounding the reform of the European Common Agricultural Policy (CAP) regarding farm subsidies would be an appropriate example of interest groups hindering the adoption of Pareto improving reforms. Such behaviour translates into market distortions (due to subsidies), inequities (as the subsidies tend to reach wealthier farmers) and environmental problems (as it tends to promote production systems' intensification) (Stiglitz 2002). Pearce (1995) adds to the debate of

"intervention failure" by bringing forward examples in environmental economics, which have worsened initial conditions (e.g. subsidies to forest conversion for livestock in Brazil up to the end of the 1980s). Similarly, the example of the Vietnamese emergency compensation strategy represents an example of a government failure. The initial compensation measures promoted the spread AI given that compensation levels varied between Vietnamese provinces (implying movement of animals between provinces, thus spreading the disease) (Riviere-Cinnamond 2005).

This section has debated the role of public failure in the increase of public health treats from animal origin. It has pointed out that further attention needs to be given to research on this area. Nonetheless, preventing the occurrence of such diseases needs to be addressed and this implies finding funds. Given the similarities brought forward throughout the thesis with the environmental economics arena, the next section will discuss a possible framework for financing emerging and zoonotic disease (i.e. transboundary) prevention adapting from the environmental economics literature. The debate will be based on the examples presented in chapter 3 regarding funding mechanisms.

6.3 Financing for animal health funds

In 1997 Pearce debated the different mechanisms that would be available to fund for environmental conservation (Pearce 1997). Linking to the above discussion regarding the role of government in trying to solve market failures and the similarities put forward throughout the thesis with environmental economics (see sections 2.3.1, 2.3.1.2, 4.3.2.1 and 4.3.2.2), this section presents the possible mechanisms that could be used to finance animal health.

One of the reasons given in environmental economics to explain why global incentives to finance biodiversity conservation have tended to fail is that "international environmental agreements seeking to conserve global public goods have an in-built instability because of their failure to account more readily for the role that has to be played by mutual economic incentive systems" (Pearce 1997). In the animal health arena however economic incentives exist internationally to control transboundary animal diseases (TADs). The earliest example of such international willingness to control TADs was the creation of the OIE in 1924 (OIE 1924), hence much earlier than for example WHO or FAO. The OIE mandate was enacted and ratified by 27 countries in order to control major TADs that undermined trade at the beginning of the twentieth century. As with most preventive measures, once OIE reached the aim of controlling several TADs important in trade terms, its role was reduced to monitoring. However, animal production intensification, new technologies in food industry processing and increased international trade of animal and derived products within the WTO context have revamped OIE's mandate. Returns to controlling and preventing animal disease spread, including zoonoses, were put forward at the beginning of the twentieth century and the same rationale is used nowadays at the beginning of the twenty first, even enhanced as it is an even bigger global scale with the possibility of world wide implications.

However, it is obvious that depending on the nature of each of the diseases the degree of 'publicness' debated in section 2.3 will vary. Thus, some diseases will have features of 'localness' as put by Pearce (1997) in environmental terms given that they will be more rival and excludable than others. However, SARS, AI or arguably BSE would be cases with a bigger global public good component. Finally,

even if there is a strong level of public good characteristic as it is the case of AI, the willingness to pay of stakeholders is likely to vary widely.

Pearce mentioned that a "Hume-Smith approach to global environmental problems would suggest that the role of governments in solving such problems should be confined to setting a framework and then leaving the parties to negotiate the 'global bargains' in a context of mutual self-interest" (Pearce 1997). The same reasoning could be applied in the animal health arena. The underlying idea is therefore to move away from a Pigouvian command and control view of government's role towards a Smithian vision of market creation, whilst bearing in mind that individuals act within a social context as exposed in sections 5.4.1.1.

Drawing from Pearce's reasoning, the following options are debated to fund for animal health: (i) risk and private sector finances, (ii) modifying the flow of private funds, (iii) financial incentives for private sector financing, and (iv) market creation and regulation.

6.3.1 Risk and private sector finance ·

Following a Smithian reasoning, there is a need to reduce the reliance on central government finances. Pearce points out in the context of environmental economics two main challenges faced when dealing with sustainable financing: (i) directing aid flows towards countries where sustainable development problems are greatest, and (ii) modifying how funds are channelled, thus making them more consistent with sustainable development goals (Pearce 1997). These lines of thinking draw some similarities with Stiglitz's when he mentioned that

"borrowing has a greater impact at the beginning of [developing countries'] learning curves" (Stiglitz 1989).

In the first case, however, such flows will be confronted generally with high risks for private markets, which as Pearce (1997) points out, could be diminished by increasing information (also debated in section 6.1.1 along Stiglitz's lines). The degree of market liberalisation would be an important factor in investment decision taking. As pointed out by Pearce, although SAP have been largely criticised (see also the introduction chapter section 1.1), it does not seem pragmatic to foresee private sector investment in a developing country where protectionism and distorting policies hinder markets. In addition, political instability in some developing countries still remains an important private sector deterrent.

International organisations might help in the role of reducing this risk for the private sector. An enhanced risk-taking context might help influencing the direction of private investment. Underwriting these risks might take several forms varying from providing insider information for the private sector (as these are a considerable barrier for private investment) to financial guarantees should private sector agree to financial investment "over and above what conventional risk appraisal would consider the norm for that country" (Pearce 1997). An advantage of this approach is that it can be country selective (Pearce 1997), thus these mechanisms could be targeted to undertake development activities in African countries when the focus is poverty reduction, and to Asian countries when the objective is also to reduce public health hazards associated with livestock production intensification.

6.3.2 Modifying the flow of private funds

In the second case, modifying the nature of private funds' flow is related to targeting the "proper" context for technology transfer. With regard to the latter, community-based workers and their role as a health technology tool has been debated in section 4.3.2 (i.e. 'selective' and 'comprehensive' PHC). If they were seen as an animal health technology tool, the options presented below would apply to the PAHC approach.

Similarly, in Asian countries production intensification is related to improved technology. However, technology transfer needs to take into account those problems that may arise, which range from environmental pollution (animal waste) to public health (e.g. increase of vector borne diseases due to the need of water reserves or increased incidence of cysticercosis because of lack of food safety inspectors). Changes in private investment in the animal health and production sector might be influenced:

(i)   By the evolution of markets, particularly due to consumers' pressures (mainly in importing developed countries). Governments can facilitate this option through market-based instruments such as taxes, user charges or tradable quotas (following Pearce, as a prerequisite, prevailing subsidies must be removed). However, political interference is likely to arise with this option (e.g. regulatory capture - sections 2.2.4, 2.3.1.2, 3.3.2 and 3.4.3.3). This has already been pointed out by Kemp in the contexts to environmental economics (Kemp 1997);

(ii)   By information programmes which would increase private sector's financial benefits through the adoption of technologies conveying animal/public health prevention and/or with poverty reduction potential;

(iii)   Through financing mechanisms that effectively compensate private sector investment for what remains a higher cost than otherwise would have been should another technology had been used.

The last two options require the role of governments, international organisations and NGOs as information and financial sources. Given that private sector seeks to increase returns on investments, it is not to be expected that it would voluntarily adhere to such options. Consumers need to accept that they will have to pay for the adoption of such technologies. In the case of environmental sustainability, the Global Environmental Fund (GEF) was created with the aim to take into account such "incremental costs" which convey certain degree of publicness (e.g. infrastructure etc.). As highlighted by Pearce (1997), private investors "are there to make an acceptable return to their shareholders. If the world in general wants those investments to meet some sustainability objective, the world must be prepared to pay the private sector for costs it otherwise have no incentive to meet". The concept of incremental cost funding from private sector may be more interesting when dealing with bilateral agreements as benefits could be localised (as opposed to multilateral agreements which would seek global objectives). Following Pearce's lines, what is suggested is that some bilateral aid is earmarked for topping up private investment so as to secure localised private investment. This would allow for the funding of "free rider" goods such as infrastructure or communications.

A similar reasoning may apply to the animal health sector. Consumers are increasingly asking for safer products. Such demand translates in the private sector into new technologies and measures applied along the food chain to ascertain that food products from animal origin are safe. This move implies

investments, which translate into higher prices for consumers. In developed countries where the legal framework allows governments to act through indirect regulation vis-à-vis food producers and processors (through tort liability laws which translate into self-regulation and certification measures in food companies) compliance with increasingly tight food safety and animal health standards may be borne by industries, and subsequently by consumers (Riviere-Cinnamond, Paschali and Wells 2005). However, due to the indirect regulation approach, companies are allowed to search for the most cost-effective technologies in order to comply with the national food safety standards. Conversely, in developing countries where the legal enforcement framework tends to be weak, government control over food safety and animal health (if at all) tends to be direct regulation. This implies that food processors have to implement specific technologies without being able to choose a more cost-effective method. This translates into higher costs for the government (as it has to perform the monitoring activities) and for the companies (as they it is compulsory for them to implement a specific technology) (Riviere-Cinnamond, Paschali and Wells 2005). In developing countries (as well as in developed) regional bodies are seeking to harmonise animal health (especially important in the case of TADs) and food safety standards (e.g. UEMOA[40], SADC[41], CAN[42], MERCOSUR[43]). In such cases, earmarking funds to finance these regional initiatives would follow Pearce's reasoning and allow securing localised private sector investment.

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[40] Union Economique et Monétaire Ouest-Africaine.
[41] Southern Africa Development Community.
[42] Comunidad Andina.
[43] Mercado del Común del Sur.

6.3.3 Financial incentives for private sector financing

In the specific context associated to the animal health-public health interface, market forces do also apply. However, as mentioned by Pearce in the context of 'environmental markets', provision of incentives through proper pricing of "environmentally bad" technologies may be a way to enhance this market (Pearce 1995; Pearce 1997). Such policies refer mainly to taxes or subsidies to the private sector (see chapter 3 regarding existing taxes associated to animal health in section 3.4). As well meaning as these interventions may be, they should be carefully examined given that they might have pervasive consequences. An example refers to the subsidy for intensification of agricultural and livestock production in the European Union. Consumers' concerns regarding public health hazards derived from processed foods, their origin and production procedures of animals in the EU are increasingly under scrutiny. Such tendency points an opposite direction to that which the EU Common Agricultural Policy aimed at after World War II. Production systems in the EU tend therefore to focus on extensive environmentally friendly production.

In a similar way, the Vietnamese government is currently aiming at restructuring the poultry production system. Indeed, poultry production in Vietnam is characterised by being small-scale backyard production. This, as recently seen, conveys important public health and economic consequences. The government is therefore seeking to concentrate production (not only poultry) away from villages. Incentives are being sought to encourage farmers to get together in the periphery of Vietnamese rural provinces (called "production zones"). These incentives refer to subsidies to those farmers willing to join "farmers groups" (which conceptually remind of a cooperative structure, but cannot be called

cooperative as it has political connotations) in "production zones" (Riviere-Cinnamond 2005). Thus, financial incentives are used here to promote private sector restructuring. Nonetheless, such restructuring confronts Vietnamese government to several problems varying from cultural (as backyard poultry production is highly entangled to the Vietnamese lifestyle) to environmental (e.g. waste management etc.) and land availability for such zones.

6.3.4 Market creation and regulation

An important aspect of public health and poverty reduction activities is that returns to investment seem lower than for other commodities. This is because there is generally no market for non-monetary benefits and refers to the missing markets elaborated under section 2.2.5 following Stiglitz's market failure analysis. Under such circumstances there is lack of motivation to invest in, for example, community-based animal health systems, cysticercosis control or trypanosomosis control. Adapting from Pearce's rationale, it is therefore important to 'demonstrate' not only the economic significance of public health hazard avoidance through cost-benefit procedures, but also to capture this significance "in the form of cash flows" (Pearce 1997). Such cost-benefit procedures as a tool for decision-making have already been pointed out in sections 2.3.1.2 and 4.3.2.2.

In the environmental economics literature examples abound on missing markets. To overcome this failure emphasis has been put in International Property Rights in the Convention on Biodiversity. Several possibilities for market creation have been elaborated in the environmental economics literature (e.g. Pearce 1995, 2004). One interesting example put forward by Pearce is that of "regulation induced markets" (Pearce 1995). Such type of induced markets is increasingly

being implemented in the food safety and animal health arena. The trigger for this has been the WTO Sanitary and Phytosanitary Agreement (SPS). The SPS agreement (WTO 1994) seeks to settle the minimum sanitary requirements in food safety, animal and plant health in the international trade arena. These sanitary requirements are set by standard setting bodies, which in the case of food safety and animal health are Codex Alimentarius (joint initiative between FAO and WHO) and OIE respectively.

At national level, SPS article 3 (paragraphs 1 & 4)[44] highlights that international standards are voluntary. Enforcement will exist through national regulation (direct or indirect) and the level of its enforcement will depend on maturation of the consumer's market approach, existing legal framework and level of state of law ("état de droit"). At international level, due to the structure of the international trade, products will have to comply with the import/export standards in order to enter a new territory. The import regulation, with a compulsory nature, will comply with the international OIE, Codex and Plants standards in order to be "necessary to protect human, animal or plant life or health" and "based on scientific principles" (SPS article 2, paragraph 2).

As a consequence of the SPS agreement, national governments adhering to the WTO tend to set food safety and animal health standards at least at SPS levels, but they are often stricter. The manner in which governments set their regulatory framework is likely to have repercussions over food producers and processing industries (Riviere-Cinnamond, Paschali and Wells 2005).

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[44] Available at: http://www.wto.org/english/docs_e/legal_e/15-sps.doc

Thus, two forms of regulation induced market may exist, and these are through (i) direct (ex-ante) regulation, and (ii) product liability (or ex-post regulation) (see figure 12). These two sorts of public regulation may be complementary or substitutive (eventually they may conflict with each other) when trying to establish incentives for producers and processors to adopt effective food safety quality controls.
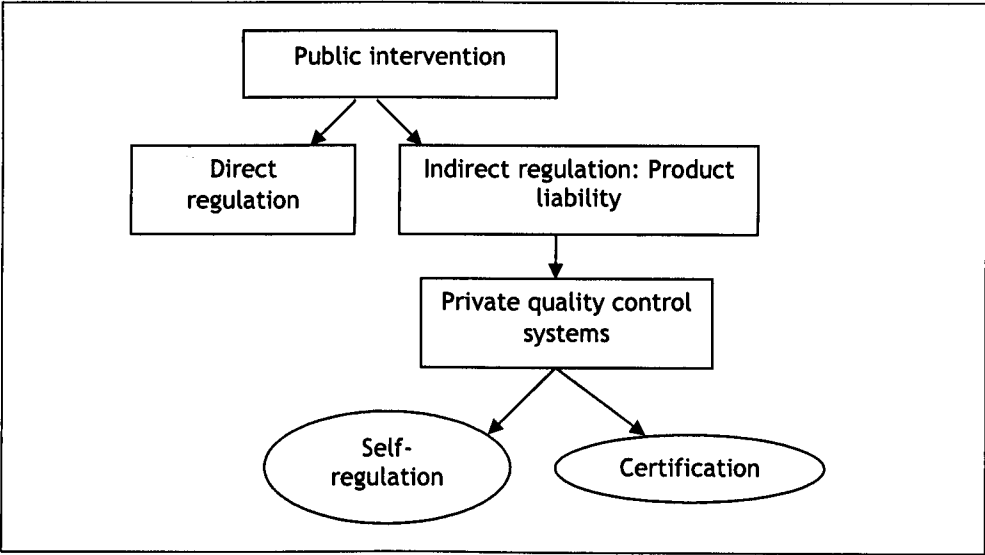
Figure 12: Types of induced regulation in the animal health and food safety market

Direct regulation refers to inspection, product testing, and other programmes attempting to ensure the quality of the product by specifying how it is produced and/or its final quality. Companies found not to meet the standards are penalized. Such ex-ante direct interventions are referred to in the literature as Command and Control (CAC). CAC may be divided into:

(i) CAC standards for performance (e.g. sampling and testing for *Salmonella* in the EU);

(ii) CAC standards for processing (e.g. Good Agricultural Practices (GAP), Good Hygiene Practices (GHP)). GAP, which includes the livestock sector, may be mandatory as it is the case in Thailand (FAO 2005), or HACCP, which is compulsory in the meat sector in Mexico (Maldonado, Henson, Caswell et al. 2004). This would tend to be the case in many developing countries where the legal contractual framework does not allow prosecussion of those food processors that incur public health damage. Conversely, in developed countries GAP and GHP tend to be used as guidelines. Given that the legal framework is effective, government control is less direct, hence leaving public health responsibilities to firms and producers. This is why EUREPGAP-IFA[45] (which includes guidelines for livestock - Integrated Farm Approach - IFA) is a private initiative of European retailers;

(iii) CAC standards for mandatory disclosure of information (e.g. providing information on the specific ingredients and quantities included in the product through labelling).

Thus, direct regulation tends to be used in contexts were the legal framework is not enforced or when decided by the government as a reaction to consumers' risk perceptions. Government direct control is the only way in which a nation may thus attain a certain public health and food safety level when little legal enforcement exists. Although it can be argued that direct control may reduce transaction costs (see debate at different levels in sections 2.2.4, 2.2.5, 2.4.1, 3.2.1, 3.3.2, 3.3.3, 4.3.2, 4.3.3, 4.4.3), public procedures (e.g. monitoring) incur high costs at governmental level.

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[45] http://www.eurep.org/farm/Languages/English/index_html

Product liability on the contrary refers to ex-post regulation. It punishes companies that produce products of insufficient quality. Such regulatory method is described as incentive-based (Henson and Caswell 1999). The aim of this regulatory method is to allow producers and processors to achieve the adequate levels of animal health and food safety standards in a cost effective way. Examples include releasing information to consumers so as to allow them the evaluation and avoidance of health hazard; reducing information costs by subsidizing the development of tests for new pathogens; enabling and assisting implementation of contractual agreements with private entities to release public certification of products meeting the minimum food safety standards (e.g. bodies such as International Standard Organisations (ISO)); making rights and responsibilities of the implicit contract in a private sale clear by imposing the need for due-diligence (enforced through the country's legal framework) (Henson and Caswell 1999).

Under indirect public regulation, food processing companies and producers have a legal incentive to implement private quality control systems. Government's tort liability laws create an incentive for firms to reduce safety problems. The objective is to achieve the national level on food safety and animal health set by each government. Governments generally follow Codex and OIE lines although countries are free to implement tighter levels when dealing with their national food safety and animal health levels. Private control systems may thus be divided into (i) self-regulation, and (ii) certification.

Self-regulation refers to internal control systems assuring a product's quality. In that scenario, it is the company that sets, monitors and self-certifies the control parameters. This type of regulation is, however, not limited to individual firms.

As seen in the UK, self-regulation can be applied to trade organisations covering the majority of the market supply such as retailers (e.g. Sainsbury, Tesco). An example in the USA of self-regulated standard are the generous requirements on cage size for hens, a welfare standard that is imposed by some large food processors and retailers in the USA and Canada;

Certification can take various forms. It is mainly based on third party certification of product quality and monitoring. These third parties may be customers, industry trade associations or other bodies such as International Standard Organizations (ISO). Examples in the EU including accredited certification bodies by EUREPGAP in the livestock sector are Agrar-Control GmbH (based in Germany, approved for the sub-scopes: combinable crops, cattle and sheep, dairy, pigs, poultry), Skal International - Control Union Certification (based in the Netherlands, approved for the sub-scopes: cattle and sheep, dairy, pigs, poultry, combinable crops). In the USA, examples of ISO abound. For example, certification for organic meat follows the "ISO guide 65 for Organic Certification Bodies"[46] and has 17 bodies approved.

Both private quality control systems (self-regulation and certification) can be used as an offensive strategy, thus as a mechanism to increase market share by delivering higher quality, or as a defensive mechanism to protect current market share from erosion. In both cases thus, regulation induces market creation (see debate over community animal health workers legislation in chapter 5).

The development of the food processing industry has sharpened information asymmetry. Indeed, processing, additives, pesticides, antibiotics, growth

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[46] http://www.ams.usda.gov/lsg/arc/ARC1012.pdf

promoters, preservatives etc. are increasingly used in the food industry, including livestock. Such regulatory mechanisms have been put in place because consumers "cannot ascertain the safety of many food products", thus "they are unable to express preferences for great safety in the market place" (Unnervehr and Jensen 1999). Food is decreasingly becoming an experience good as for example, in the case of BSE, incubation period (in humans) tends to be of 15 years. Thus technology through new processing methods widens the information asymmetry gap (refer to section 2.2.5). In addition, producers or retailers may find it difficult to ascertain the safety of their products given the increasingly complex food chain. The complexity of such structures leads to Williamson's transaction cost economics and the mechanisms of governance. Complexity here refers not only to the physical processing of products but also to the contractual relation between agents in the chain (Williamson 1979). Such contracts are set over longer periods of time, thus classical contract law does not apply (see debate in section 3.3.3). Mechanisms need to be set to ascertain that the outcome of the contract, given the time span, is going to be fulfilled. Hence, the natural evolution in the food market sector leads to new contractual relations between the actors.

Indeed, in developed countries where regulatory frameworks are enforceable through a consistent legal system, indirect regulation through product liability laws allows food processors and producers to apply either self-regulatory or certification measures to comply with the national requirements. In developing countries however, direct government control is likely to be the principal regulatory measure given that their legal framework tends to be weaker and hence law enforcement is more difficult. In developed countries thus, firms are allowed to find cost-effective measures to attain the required levels, hence

lifting the economics away from public resources. Conversely, in developing countries direct regulation implies that food producers and processors have to comply with pre-established guidelines, which might well not be the most cost-effective alternatives. Hence, costs fall not only in the industry sector, but also in the national treasury as direct regulation implies important government intervention such as monitoring (Riviere-Cinnamond, Paschali and Wells 2005).

This kind of regulation-induced market is managed to capture the value of public health interventions (through animal health and food safety) by implementing the beneficiary pays principle. In this type of market it is the end consumer who pays a higher price for safer food (depending on the relative elasticities of supply and demand).

The tendency to move away from Pigouvian command and control procedures (debated at the beginning of this chapter) is therefore taking place in the animal health and food safety arena. However, the move towards a less interventionist approach in this arena tends to happen mainly in developed countries because of the established legal framework. Such situation points out what has been debated earlier in this section: that government intervention is nonetheless needed to some extent, and especially in the initial phases (Stern 2002). However, the Coasian theorem encourages the use of less interventionist mechanisms of regulatory options (i.e. not command and control).

6.4 Bridging community-based structures to national level

Chapters 4 and 5 have extensively debated CAH systems from the qualities of workers to the criteria to evaluate them at national level. Previous sections have put forward and discussed the possible financing strategies to fund for animal

health. However, questions remain about the existing option to link community-based initiatives to a wider national system and the role of government. Indeed, how to help those at community level to link with national structures is a crucial question in the development arena. Researchers at the International Food Policy Research Institute (IFPRI) have put a similar question forward (Orden, Torero and Gulati 2004).

Section 5.4.2 has highlighted one of the crucial aspects of these communities: the need to "trust" the community worker. In addition, this trust has been qualified as "calculative trust". Trust in the community based context is highly associated to the social rules applying in those communities (see section 5.4.1.1). It thus appears that the community member as well as the worker make decisions within the societal context of the community.

Several authors consider the individual at the centre of rational decisions taken in an economy. It has been labelled in the economics literature as "methodological individualism". This school of thinking argues that decisions taken by individuals are not influenced by social values. As opposed to Adam Smith's point of view, which emphasises that individual actions exist within a given social framework, others argue that it is the individual action that will change institutional rules. Arrow in his 1994 paper also states that there is an "ineradicable social element in the economy" (Arrow 1994), which reminds of the issues debated in the previous chapter regarding trust (see section 5.4.1.1). He therefore follows the lines of Buchanan and Hayek in acknowledging that there is a link between methodological and normative individualism. It is important to bear in mind this debate within the rural setting.

Linking community-based systems to national systems involve two sets of societies: the rural ones in remote areas, and the public institution or government ones. The latter, as mentioned earlier in this section, incurs public failure especially when targeting remote areas (because of the reasons stated in section 6.2). Thus, policy decisions tend not to be Pareto efficient at that level. In addition, rural community members' economic decisions are taken in association with their social context and structure. It seems obvious at this stage that a rapprochement between these two contexts is needed in order to enable the bridging.

On the one hand, public institutions need to be more aware of the difficulties encountered at community level. As mentioned in the introduction section in chapter 5, decision makers tend to base their decisions regarding rural communities on technical criteria. However these criteria are not a priority for communities. If public institutions want to overcome public failure, further knowledge of the rural context of their country needs to be acquired. This might translate in employing more inhabitants of those areas in public institutions or persons with experience in the rural context. This would allow government strategies to be more in line with the actual situation on the ground, hence converging towards the same goal. On the other hand, communities need to behave more proactively. This is only obtained by exposing these communities to market forces, which requires time. In order to expose them to market forces, markets need to be created. Market creation depends heavily on availability of information. Information comes through improving telecommunications and infrastructure as well as education.

Market creation is thus crucial at community level. Should the government intervene in the animal health-public health arena, and if so, how? These are essential questions for the development of rural communities. It has been shown that this area is entangled with poverty reduction activities. Bearing that in mind, the aspects that need to be taken into account in any given country in order to assess whether, how and by whom funds should be disbursed for AHS under public health and/or poverty reduction grounds are the following:

1. Share of agricultural GDP generated from livestock.

Given that not all provinces in a country would concentrate on livestock production, for an accurate allocation of resource the share of agricultural GDP generated from livestock at province level would be more appropriate. However it could be argued that in some countries obtaining these data may be difficult.

2. Production systems types.

Generally intensive or semi-intensive production systems tend to be concentrated in peri-urban areas, whereas extensive production is located in rural areas, and finally subsistence systems in remote and pastoral areas (Orden, Torero and Gulati 2004). The implications in terms of public health threat and/or poverty reduction potential of livestock will therefore vary in relation to the setting analysed.

3. Trade in livestock and derived products.

Linked to the previous criteria is the type of market where livestock products are directed to and commercialised. Hence, in most developing countries livestock production contributes mainly to the domestic market economy. However, some

cases exist (e.g. Thailand) where the extent of livestock production concentration has enabled the participation of the country in the international arena (in the case of Thailand, poultry production). The income generated at national level from this activity is not negligible and trade bans imposed by WTO derived from animal health risks and/or public health hazards may considerably undermine the country's GDP (e.g. Avian Influenza). It is thus important to bear in mind the types of production systems as well as the markets targeted.

4. Existing animal health structures, budgets and service delivery mechanisms.

As described in chapter 3, the manner in which AH systems are structured will be highly influential in terms of delivering services. Hence, the degree of central government intervention, decentralisation, privatisation, and whether an animal health fund already exist will be critical in influencing the system's performance.

Thus, when applying the aforementioned criteria in a country like Vietnam, for example, the analysis will point out that, although livestock have poverty reduction potential (especially poultry), the main reason for fund allocation to AH structures will lie in the public hazards derived from poultry production intensification. Thus, following the previously outlined criteria:

(i)   The percentage of agricultural GDP derived from livestock in provinces such as Ha Tay, Ho Chi Minh, Tien Giang and An Giang are 39.8%, 25.7%, 17% and 18% respectively (Riviere-Cinnamond 2005);

(ii)   Production types tend be semi-intensive and concentrate in rural areas. However, the presence of smallholder producers at village level is important. This is relevant in public health terms as smallholders maintain production in the same household where they live. In the case

of AI it increases disease-spread potential especially when considering that backyard raising tends to mix animal species (notably important is the presence of pigs in the case of AI);

(iii)   Nonetheless, livestock production in Vietnam is mainly oriented towards domestic market. It should however be highlighted that currently negotiations within the WTO arena are taking place in order to allow Vietnam to adhere to the organisation;

(iv)   Finally, Vietnamese animal health structures are undergoing a decentralisation process, aiming at giving provinces more responsibility regarding their expenditure of public funds. However, to a certain extent central government is still important as only 15 of the 64 Vietnamese provinces generate income. Thus, the remaining provinces still depend on central government disbursement of funds [47].

A different scenario is that of Kenya, where the need for AHS could be argued on grounds of poverty alleviation. Hence:

(i)   Livestock share of agricultural GDP might not be significant as in Kenya the 80% of livestock keepers are concentrated in arid and semi-arid lands. Pastoral farmers therefore follow a subsistence production pattern;

(ii)   Trade, logically is minimal, if existing at all, given the previously debated market failures in the pastoral context;

(iii)   As opposed to the Vietnamese context, animal density in Kenyan ASAL is remarkably lower. Hence the public heath risks conveyed are of different nature. Thus, remote and rural areas, where density is lower, will tend to

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[47] Personal communication: Son, N.T., Deputy head of livestock production division, Ministry of Agriculture and Rural Development. 2005: Hanoi.

convey "classical" zoonotic disease spread, such as trypanosomosis or brucellosis. Conversely, highly populated areas (both in humans and animals) will have the potential of generating highly contagious zoonotic and emerging and re-emerging diseases (e.g. Rift Valley Fever, or as predicted, Avian Influenza through migratory birds), thus linking to the "livestock revolution" implications previously debated in section <u>3.1.1</u>.

(iv)   Finally, animal health structures as debated throughout the thesis have been dismantled following the SAP programmes. Hence, rural and remote areas tend to be underserved given their relative low potential for developing market oriented service delivery.

Having debated the role and extent of government intervention in the animal health and associated public health market, as well as the criteria necessary for appropriate disbursement public funds, the next section brings together the main conclusions of the thesis.

6.5 Conclusions

The thesis aimed at tackling four main objectives. These were: (i) to demonstrate the usefulness of applying a new perspective in the economic analysis of animal health systems; (ii) to identify the structure and components of animal health systems and the possible mechanisms for financing animal health activities; (iii) to elaborate a conceptual framework in which to assess community-based animal health service delivery in rural areas at national level; and (iv) to assess the "ideal qualities" needed in animal health workers in order for community-based animal health systems in Kenyan pastoral areas to be sustainable.

The discussion in this chapter has brought forward the debate over incentives to develop sustainable market structures and the role of government. The role of public failure as a cause for increased public health threats from animal origin has been elaborated. This section concludes that a certain degree of public intervention is needed with regard to the development of the animal health market. However, other interventions than Pigouvian command and control procedures may be applied depending on the degree of development of the animal health market.

The existing strategies for financing for animal health at supranational level, which in turn contribute to poverty reduction, are discussed in that section. Criteria for fund allocation have been elaborated. These are (i) the country's share of agricultural GDP generated by livestock, (ii) types of production systems existing in the country, (iii) trade in livestock and derived products, and (iv) existing animal health structures.

The analysis in the discussion section concludes that the contractual framework in which transactions take place becomes increasingly important when communities' production activities increase. In this case, regulation induced markets are seen as a powerful tool in the public health arena taking into account the context of the increasingly stringent WTO sanitary and phyto-sanitary (SPS) standards.

However, the design and implementation of community-based animal health systems are crucial to the sustainability of the systems. These systems need to be

market oriented and workers need to be selected following the criteria of the community members. Otherwise, the likeliness of system failure is high.

Three main areas where further research is needed have been identified. These are:

(i)   obtaining the appropriate balance between market forces and public intervention to enable the evolution from a self-sustaining situation towards a functional market situation,

(ii)   examining the reasons for public sector failure in the animal health arena,

(iii)   improving animal health market creation within rural communities

The stimulus of the thesis was to study the causes that have led to an increase of public health threats from animal origin. The thesis has contributed significantly to the research arena by analysing critical institutional aspects in public health systems associated to the prevention of zoonotic disease spread.

References

Abel-Smith, B. (1963). "Paying the family doctor." Medical Care **12**.

Abel-Smith, B. (1966). Value for Money in Health Services. London, Heinemann.

Abel-Smith, B. (1992). "Health insurance in developing countries: Lessons from experience." Health Policy and Planning **7**(3): 215-226.

Abel-Smith, B. and P. Rawal (1992). "Can the poor afford 'free' health services? A case study of Tanzania." Health Policy and Planning **7**(4): 329-341.

Abel-Smith, B. and P. Rawal (1994). "Employer's willingness to pay: The case for compulsory health insurance in Tanzania." Health Policy and Planning **9**(4): 409-418.

Admassu, B. (2003). Primary animal health care in Ethiopia: the experience so far. Primary animal health care in the 21st century: shaping the rules, policies and institutions. K. Sones and A. Catley. Mombasa, African Union.

Ahuja, V. (1999). Commercialisation of Livestock Health and Breeding Services. Papers and Proceedings, Indian Institute of Management, Ahmenabad; The World Bank, Washington D.C.; The Swiss Agency for Development and Cooperation, Bern, Switzerland.

Ahuja, V. (2004). "The economic rationale of public and private sector roles in the provision of animal health services." Revue Scientifique et Technique **23**(1): 33-45.

Ahuja, V., S. George, K. E. McConnel, et al. (2000). Agricultural Services and the Poor: Case of Livestock Health and Breeding Services in India, India: Indian Institute of Management, Ahmedabad; Washington D.C.: the World Bank; Bern, Switzerland: Swiss Agency for Development and Cooperation.

Akin, J., N. Birdsall and D. Ferranti (1987). Financing health services in developing countries: an agenda for reform. Washington D.C., World Bank.

Animal-Health-Australia (2003). Animal Health Australia, http://www.aahc.com.au/about/what.htm. 2003.

Anteneh, A. (1984). Financing animal health services in some African countries. AAU Workshop Paper No 3: Financing the Recurrent Costs of Agricultural Services in Developing Countries, Windsor, UK, ODI Pastoral Development Network.

ApSimon, H. and R. F. Warren (1996). "Transboundary air pollution." Energy Policy 24(7): 631-640.

Arnott, R. J. and J. E. Stiglitz (1988). "The basic analysitics of moral hazard." Scandinavian Journal of Economics 90(3): 383-413.

Arnott, R. J. and J. E. Stiglitz (1991). "Moral hazard and nonmarket institutions: Dysfunctional crowding out of peer monitoring?" The American Economic Review 81(1): 179-190.

Arrow, K. (1963). Social choice and individual values. New York, Wiley.

Arrow, K. J. (1985). The Economics of Agency. in Pratt J, Zeckhauser R. (1985), Principals and Agents. The Structure of Business. Boston, Harvard Business School.

Arrow, K. J. (1994). "Methodological individualism and social knowledge." The American Economic Review 84(2): 1-9.

Atkinson, A. B. (1977). "Optimal taxation and the direct versus indirect tax controversy." Canadian Journal of Economics 10(4): 590-606.

Bainbridge, T. (1999). "Community-based animal health care in Zambia." Development-in-Practice:-an-Oxfam-Journal 9(3): 337-341.

Bastien, J. W. (1990). "Community health workers in Bolivia: adapting to traditional roles in the Andean community." Social Science and Medicine (United Kingdom) 30(3): 281-287.

Bazeley, P. (2003). Computerized data analysis for mixed methods research. Handbook of mixed methods in social science and behavioural research. A. Tashakkori and C. Teddle. London, Sage: 385-417.

Begg, D., S. Fischer and R. Dornbusch (2000). Economics. Berkshire, England, McGraw-Hill.

Belize (2000). Belize Agricultural Health Authority Act Chapter 211, Revised Edition 2000. Belize, Government of Belize.

Bender, D. E. and K. Pitkin (1987). "Bridging the gap: the village health worker as the cornerstone of the primary health care model." Social Science and Medicine 24(6): 515-28.

Bennell, P. (1997). "Privatization in Sub-Saharan Africa: Progress and prospects during the 1990s." World Development 25(11): 1785-1803.

Bennett, S., A. Creese and R. Monasch (1998). "Health insurance schemes for people outside formal sector employment." World Health Organisation 16.

Bentley, C. (1989). "Primary health care in north west Somalia: a case study." Social Science and Medicine 28(10): 1019-1030.

Bentley, C. (1989). "Primary health care in northwestern Somalia: a case study." Social Science and Medicine 28(10): 1019-1030.

Berman, P. A. (1982). "Selective primary health care: is efficient sufficient?" Social Science and Medicine 16: 1054.

Berman, P. A. (1984). "Village health workers in Java, Indonesia: coverage and equity." Social Science and Medicine 19(4): 411-22.

Berman, P. A., D. R. Gwatkin and S. E. Burger (1987). "Community-based health workers: head start or false start towards health for all?" Social Science and Medicine 25(5): 443-59.

Blanc, P., G. Gori, H. Kamil, et al. (2003). Document study on animal health auxiliaries, AU-IBAR, French Ministry of Foreign Affairs, CIRAD-EMVT, Veterinaires Sans Frontieres.

Bland, M. (2000). An introduction to medical statistics, Oxford Univarsity Press.

Boardman, A., D. Greenberg, A. Vining, et al. (1996). Cost benefit analysis: Concepts and practice. New Jersey, Prentice-Hall.

Bohm, P. (1972). "Estimating the demand for public goods: An experiment." European Economic Journal 3: 111-130.

Bose, A. (1983). The community health worker scheme: an Indian experiment. Practising Health for All. R. J. a. W. G. Edited by Morley D.: 38-48.

Buchanan, J. M. (1965). "An economic theory of clubs." Economica 32(125): 1-14.

Buchanan, J. M. (1968). The Demand and Supply of Public Goods. Chicago, Rand McNally.

Buchanan, J. M. (1975). "Public finance and public choice." National Tax Journal 28(4): 383-394.

CARE-Peru (2001). Las iniciativas de acercamiento al mercado y la seguridad alimentaria de las familias pobres. El caso de los Sanitarios Ganaderos de Puno (unpublished). Peru, CARE.

Catley, A. (1999). Community-based animal health care in Somali areas of Africa: A review. Nairobi, Vetwork UK.

Catley, A. (2002). Participatory impact assessment of the Save the Children USA community-based animal health project. Dollo Ado and Dollo Bay Somali National Regional State, Ethiopia. Nairobi, AU/IBAR CAPE Unit.

Catley, A. (2004). Livestock, growth, trade and opportunity, DfID e-Forum 'New Directions for Agriculture in Reducing Poverty' available at: http://dfid-agriculture-consultation.nri.org/maillists/growth-and-poverty/msg00058.html. 2004.

Catley, A., S. Blakeway and T. Leyland (2002). <u>Community-based animal healthcare.</u> <u>A practical guide to improving primary veterinary services</u>. London, ITDG Publishing.

Catley, A., P. Delaney and H. McCauley (1998). Community-based animal health services in the Greater Horn of Africa: An assessment, USAID-USDA: 65.

Catley, A. and T. Leyland (2001). "Community participation and the delivery of veterinary services in Africa." <u>Preventive-Veterinary-Medicine</u> 49(1-2): 95-113.

Catley, A. and T. Leyland (2002). "Overview: community-based animal health workers, policies, and institutions." <u>PLA-Notes -International-Institute-for-Environment-and-Development</u> 45: 4-6.

Catley, A., T. Leyland and B. Kaberia (2002). Taking a long-term perspective: Sustainability issues. <u>Community-based animal healthcare. A practical guide to improving veterinary services</u>. A. Catley, S. Blakeway and T. Leyland. London, ITDG Publishing.

Catley, A., L. Lynen and S. Nalitolela (2002). "Linking research and community-based animal healthcare in East Africa." <u>PLA-Notes -International-Institute-for-Environment-and-Development</u> 45: 42-48.

Catley, A. and J. Mariner (2002). Where there is no data: participatory approaches to veterinary epidemiology in pastoral areas of the Horn of Africa, Issue-Paper - Drylands-Programme,-International-Institute-for-Environment-and-Development: 20.

Catley, A. and A. A. Mohammed (1996). "The use of livestock-disease scoring by a primary animal-health project in Somaliland." <u>Preventive Veterinary Medicine</u> 28: 175-186.

Chabot, H. T. J. and J. Bremmers (1988). "Government health services versus community: Conflict or harmony." Social Science and Medicine 26(9): 957-962.

Chalkley, M. and R. Robinson (1997). Theory and Evidence on Cost-sharing in Health Care: An Economic Perspective. London, Office of Health Economics.

Chema, S., L. O. Oruko and C. Heffernan (2001). Livestock Services and the Poor, Appendix I and II: The Kenya case study and report of consultant's visit, Draft report prepared for IFAD.

Chilonda, P. and G. Van Huylenbroek (2001). "Attitudes towards and uptake of veterinary services by small-scale farmers in Eastern province, Zambia." Outlook on Agriculture 30(3).

Chipeta, S., E. Hoydahl and J. Krog (2003). Livestock services and the poor. A global initiative. Collecting, coordinating and disseminating experiences. Draft Report. Rome, DANIDA, IFAD and The World Bank: 89.

CIFA (2002). Sustainable animal health care delivery system in pastoral area of Marsabit/Moyale - Concept Paper Draft. Marsabit, Kenya, CIFA: 8.

Coase, R. (1974). "The lighthouse in economics." Journal of Law and Economics 17: 357-376.

Cook, C. W. and P. L. Hunsaker (2001). Management and organizational behavior. New York, McGraw-Hill Irwin.

Cross, P. N., M. A. Huff, J. D. Quick, et al. (1986). "Revolving drug funds: Conducting business in the public sector." Social Science and Medicine 22(3): 335-343.

Cullis, J. and P. Jones (1998). Public finance and public choice. Great Claredon Street, Oxford, Oxford University Press.

Curran, M. M. and H. G. MacLehose (2002). "Community animal health services for improving household wealth and health status of low-income farmers." Tropical Animal Health and Production 34(6): 449-470.

Dasebu, S., R. Escrivao and R. Oakeley (2003). The safe administration of medicines: Can CBAHWs be trusted? Community-based animal health workers: Threat or opportunity? The-IDL-Group. Crewkerne, UK, The-IDL-Group.

deHaan, C. and S. Bekure (1991). Animal health services in sub-Saharan Africa. Initial experiences with alternative approaches. Washington D.C., The World Bank.

Delgado, C. L., M. W. Rosegrant and S. Meijer (2001). Livestock to 2020: The Revolution Continues. Paper presented at the annual meeting of the International Trade Research Consortium (IATRC) on January 18-19, 2001, Aukland, New Zealand.

Delgado, C. L., M. W. Rosegrant, H. Steinfeld, et al. (1999). Livestock 2020. The next food revolution. Washington D.C.: International Food Policy Research Institute, Rome: United Nations Food and Agriculture Organisation, Nairobi: International Livestock Research Institute.

Delgado, C. L., M. W. Rosegrant, H. Steinfeld, et al. (2000). The Coming Livestock Revolution. Background paper n.6, Department of Economic and Social Affairs, Commission of Sustainable Development, Eighth Session, New York, Food and Agriculture Organisation.

Dolberg, F. (2003). Research and development of rural poultry production in developing countries. Aarhus, Denmark, University of Aarhus: 10.

Donaldson, C. and K. Gerard (1993). Economics of Health Care Financing. The Visible Hand. London, MacMillan Press LTD.

Donhauser, F. and F. J. Pauels (1997). Scope and limitations for establishing a joint funding scheme to support official control and eradiation programmes against contagious livestock diseases in Turkey, GTZ: 25.

Dorward, A., J. Kydd and C. Poulton (1998). Smallholder Cash Crop Production under Market Liberalisation: A new Institutional Economics Perspective. Wallingford, CAB International.

Dugger, W. M. (1993). Transaction cost economics and the state. Transactions, Markets and Hierarchies. C. Pitelis. Oxford, Basil Blackwell.

Economist (The). (Nov 10th 2005). Bird flu: A meeting to discuss the global response to bird flu demands funds. The Economist. London: http://www.economist.com/displaystory.cfm?story_id=E1_VTPVQRD.

Economist (The). (Nov 11th 2005). Fears over bird flu. The Economist. London: http://www.economist.com/agenda/displaystory.cfm?story_id=E1_VTPQVST.

Economist (The). (Nov 17th 2005). Zoonotic infection: Some of the efforts to control bird flu could be usefully extended to tackle other emerging human diseases that come from animals. The Economist. London: http://www.economist.com/displaystory.cfm?story_id=E1_VTGVQPN.

Efron, Y. (1997). HACHAKLAIT: Mutual society for clinical veterinary services and livestock insurance in Israel. Israel, Hidekel Press.

European Union (2003). European Food Safety Authority, EU. 2003.

Evans, A. W. (1970). "Private goods, externality, public goods." Scottish Journal of Political Economy 17(1): 79-89.

Evans, B. R., R. L. Doering, R. C. Clarke, et al. (2003). "The organisation of federal veterinary services in Canada: The Canadian Food Inspection Agency." Revue Scientifique et Technique 22(2): 409-421.

Evans, R. G. (1974). Supplier-induced demand: empirical evidence and implications. The Economics of Health and Medical Care. M. Perlman. New York, John Wiley and Sons.

Evans, R. G. (1984). Strained Mercy: the Economics of Canadian Medical Care. Toronto, Butterworths.

Evans, R. G. (1998). Going for gold: the redistributive agenda behind market based health care reform. Governments and Health Systems : Implications of Differing Involvements. D. Chinitz, J. Cohen and C. Doron. Chichester: Wiley.

FAO (1992). <u>Livestock Insurance in Asia. Experience of Selected Asian Countries</u>. Bangkok, Thailand, FAO Regional Office for Asia and the Pacific (RAPA).

FAO (1997). <u>Profile of veterinary services in New Zealand,1995</u>. FAO electronic conference on principles of for rational delivery of public and private veterinary services, Rome, FAO.

FAO (2005). <u>Good Agricultural Practices In Thailand - Workshop (10-13 September 2005)</u>, Bangkok.

Gagnon, A. J. (1991). "The training and integration of village health workers." <u>Bulletin of the Panamerican Health Organisation</u> 25: 127-138.

Geoffard, P.-Y. and T. Philipson (1997). "Disease eradication: Private versus public vaccination." <u>The American Economic Review</u> 87(1): 222-230.

Gilbert, M., W. Wint and J. Slingenbergh (2004). Ecololgical factors in disease emergence from animal reservoir - Draft version 1. Rome, FAO: 39.

GI-LSP (2003). Livestock services and the poor. A global initiative. Collecting, coordinating and disseminating experiences. Rome, DANIDA, IFAD and The World Bank: 89.

Gimeno, E. (2003). "La organizacion de los servicios veterinarios en Latinoamerica y su evolucion." <u>Revue Scientifique et Technique</u> 22(2): 449-461.

Gish, O. (1982). "Selective primary health care: Old wine in new bottles." <u>Social Science and Medicine</u> 16: 1049.

Gold, M. R., J. E. Siegel, L. B. Russell, et al. (1996). <u>Cost effectiveness in health and medicine</u>. New York, Oxford, Oxford University Press.

Gongora, V. (2003). "Veterinary services in Belize: adapting organisational models to the needs of small economies." <u>Revue Scientifique et Technique</u> 22(2): 463-471.

Government-of-Australia (2003). Levies and Revenue Service, Government of Australia, Department of Agriculture, Fisheries and Forestry, http://www.affa.gov.au/content/levies.cfm. **2003.**

Green, A. (1999). An introduction to Health Planning in Developing Countries. Oxford, Oxford University Press.

Green, J. and N. Britten (1998). "Qualitative research and evidence based medicine." BMJ **316:** 1230-1232.

Green, J. and N. Thorogood (2004a). Analysing qualitative data. Qualitative methods in health research. J. Green and N. Thorogood. London, Sage: 173-200.

Green, J. and N. Thorogood (2004b). In-depth interviews. Qualitative methods for health research. J. Green and N. Thorogood. London, Sage Publishing: 79-106.

Greenwald, B. and J. E. Stiglitz (1987). "Keynesian, new Keynesian and classical economics." Oxford Economic Papers **39**(1): 119-133.

Greenwald, B. and J. E. Stiglitz (1993). "New and old Keynesians." Journal of Economic Perspectives **7**(1): 23-44.

GTZ (1992). Economic assessment of the basic animal health services including the Thai-German animal health project. Khon Kaen, Thailand, GTZ and the Thai Government.

Habicht, J. P. (1979). "Assurance of quality in the provision of primary medical care by non-professionals." Social Science and Medicine **13**(B): 67-75.

Hadrill, D., A. Catley and K. Iles (2002). Getting started. Community-based animal healthcare. A practical guide to improving veterinary services. A. Catley, S. Blakeway and T. Leyland. London, ITDG Publishing.

Hammersley, M. (1990). Reading ethnographic research. New York, Longman.

Hanks, J., R. Oakeley, H. Opoku, et al. (1999). Assessing the impact of community animal health care programmes: Some experiences from Ghana, VEERU and Republic of Ghana.

Hanson, K. and B. McPake (1993). "The Bamako Initiative: where is it going." Health policy and planning 8(3): 267-274.

Head, J. G. (1962). "Public goods and public policy." Public finances/Finances publiques 17(3): 197-219.

Heffernan, C. (2001). "Consumer preferences and the uptake of animal healthcare by the poor: a case study from Kenya." Journal of international development 13(7): 847-861.

Helleiner, G. K. (1992). "The IMF, The Workd Bank and Africa's adjustment and external debt problems: An unofficial view." World Development 20(6): 779-792.

Henson, S. and J. Caswell (1999). "Food safety regulation: an overview of contemporary issues." Food Policy 24: 589-603.

Holden, S. (1997). Community-based animal health workers: An example of private delivery of animal health services to small-scale farmers in marginal areas. Somerset, UK, Livestock in Development: 17.

Holden, S. (1999). "The economics of delivery of veterinary services." Revue Scientifique et Technique 18(2): 425-439.

Holden, S., S. Ashley and P. Bazeley (1996). Delivery of animal health services: synthesis of research needs. Crewkerne, Sommerset, Livestock in Development: 33.

Holden, S. and S. Chema (1996). Delivery of animal health services: Kenya. Crewkerne, Somerset, Livestock in Development: 11.

Holleran, E., M. E. Bredahl and L. Zaibet (1999). "Private incentives for adopting food safety and quality assurance." Food Policy 24(669-683).

Huttner, K., K. Leidl, D. U. Pfeiffer, et al. (2001). "Farm and personal characteristics of the clientele of a community-based animal-health service programme in northern Malawi." Tropical Animal Health and Production 33(3): 201-18.

Huttner, K., K. Leidl, D. U. Pfeiffer, et al. (2001). "The effect of a community-based animal health service programme on livestock mortality, off-take and selected husbandry applications. A field study in northern Malawi." Livestock Production Science 72(3): 263-278.

IFAD (2004a). Documentation of the Community Based Animal Health Worker Innovation, supported by the Rural Developmetn Project in North and South Kordofan States (unpublished). Rome, IFAD.

IFAD (2004b). Village animal health worker (VAHWs) - Cambodia -(unpublished). Rome, IFAD.

IRIN (2003). KENYA-UGANDA: 10 killed by Kenyan cattle rustlers, UN-IRINnews.org. 2003.

IRIN (2003). KENYA-UGANDA: 30 killed in cattle rustling incident, UN-IRINnews.org. 2003.

Jabbar, M. A., S. K. Ehui and R. von Kaufmann (2002). "Supply and demand for livestock credit in Sub- Saharan Africa: Lessons for designing new credit schemes." World Development 30(6): 1029-1042.

Jahan, N. and H. Rahman (2003). Livestock Services and the Poor in Bangladesh. A Case Study. Aarhus, Denmark, Danida, IFAD and The World Bank: 41.

Jerkins, O. B. and Anonymous (1996). People Profile. The Gabbra of Kenya and Ethiopia, The virtual research centre.

Jones, B., A. Araba, P. Koskei, et al. (2002). "Doing it for themselves: how communities developed messages and communication methods for rinderpest eradication in southern Sudan." PLA-Notes -International-Institute-for-Environment-and-Development 45: 37-41.

Katabarwa, M., P. Habomugisha, R. Ndyomugyenyi, et al. (2001). "Involvement of women in community-directed treatment with ivermectin for the control of onchocerciasis in Rukungiri district, Uganda: a knowledge, attitude and practice study." Annals of Tropical Medicine and Parasitology 95(5): 485-494.

Katabarwa, M., P. Habomugisha and F. J. Richards (2000). "Community views on health programmes in Uganda." Lancet 355(9221): 2167-8.

Katabarwa, M., P. Habomugisha and F. J. Richards (2002). "Implementing community-directed treatment with ivermectin for the control of onchocerciasis in Uganda (1997-2000): an evaluation." Annals of Tropical Medicine and Parasitology 96(1): 61-73.

Katabarwa, M. and F. J. Richards (2001). "Community-directed health (CDH) workers enhance the performance and sustainability of CDH programmes: experience from ivermectin distribution in Uganda." Annals of Tropical Medicine and Parasitology 95(3): 275-286.

Katabarwa, N., D. Mutabazi and F. J. Richards (2000). "Controlling onchocerciasis by community-directed, ivermectin-treatment programmes in Uganda: why do some communities succeed and others fail?" Annals of Tropical Medicine and Parasitology 94(4): 343-352.

Katabarwa, N., F. J. Richards and R. Ndyomugyenyi (2000). "In rural Ugandan communities the traditional kinship/clan system is vital to the success and sustainment of the African Programme for Onchocerciasis Control[Review] [9 refs]." Annals of Tropical Medicine and Parasitology. 94(5): 485-495,.

Kemp, R. (1997). Environmental policy and technical change: A comparison of the technological impact of policy instruments. Cheltenham, Edward Elgar.

Kickbusch, I. (2003). SARS: wake-up call for a strong global health policy. How to stop a virus that doesn't respect sovereignty, YaleGlobal Online. 2005.

Kleemann, G. (1999). Services Management in Livestock Development. Wiesbaden, GTZ.

Koma, M. P. K. (2000). Can private veterinarians survive in Uganda? Africa's Changing Market for Health and Veterinary Services. The New Institutional Issues. D. K. Leonard. London, MacMillan Press LTD.

Kutzin, J. (1997). "Health insurance for the formal sector in Africa: "Yes, but...""
World Health Organisation 14.

Kutzin, J. (2001). "A descriptive framework for country level analysis of health care financing arrangements." Health policy and planning 56(3): 171-204.

KVB (2003). Minimum standards and guidelines for training of community-based animal health workers in Kenya. Uthiru, Kenay, Kenya Veterinary Board: 25.

Laffont, J.-J. (2002). "Public economics yesterday, today and tomorrow." Journal of Public Economics 86: 327-334.

Laffont, J.-J. and J. Tirole (1993). A Theory of Incentives in Procurement and Regulation. Cambridge, MIT Press.

Leksmono, C. S. and J. Young (2002). "Community-based animal health workers and institutional change: the DELIVERI project in Indonesia." PLA-Notes - International-Institute-for-Environment-and-Development 45: 13-16.

Leonard, D. K. (1985). "African practice and the theory of user fees." Agricultural Administration 18(3): 137-158.

Leonard, D. K. (1990). Draft research proposal on the organisation of animal health services in Africa presented at the International Livestock Centre for Africa. The balance between public and private sector activities in the delivery of livestock services (1992). L. D. Umali, G. Feder and C. de Haan. Washington DC, World Bank Discussion Papers, The World Bank. 163.

Leonard, D. K. (1993). "Structural reform of the veterinary profession in Africa and the New Institutional Economics." Development and Change 24: 227-267.

Leonard, D. K. (2000). <u>Africa's Changing Market for Health and Veterinary Services.</u> <u>The New Institutional Issues</u>. London, MacMillan Press LTD.

Leonard, D. K. (2000). The new institutional economics and the restructuring of animal health services in Africa. <u>Africa's Changing Markets for Health and Veterinary Services. The New Institutional Issues</u>. D. K. Leonard. London, MacMillan Press.

Leyland, T. (1994). "Planning a community animal health care programme in Afghanistan." <u>RRA Notes International Institute for Environment and Development (United Kingdom)</u>(no.20): 47-51.

Loader, R. and J. E. Hobbs (1999). "Strategic responses to food safety legislation." <u>Food Policy</u> 24: 685-706.

Ly, C. (2000). Veterinary paraprofessionals in Senegal: Allocation of priorities and working behaviour. <u>Africa's Chaging Markets for Health and Veterinary Services. The New Institutional Issues</u>. D. K. Leonard. London, MacMillan Press LTD.

Ly, C. (2003). The economics of community based animal health workers. <u>Community based animal health workers: Threat or opportunity?</u> The-IDL-Group. Crewkerne, UK, The-IDL-Group.

Macedo, G. G. and C. A. B. Vieira (1983). "The fate of primary health care in Brazil." <u>I.D.S Bulletin</u> 14: 17-26.

Mahler, H. (1981). "The meaning of 'health for all by the year 2000'." <u>World Health Forum</u> 2(1): 8.

Maldonado, E. S., S. J. Henson, J. A. Caswell, et al. (2004). "Cost-benefit analysis of HACCP implementation in the Mexican meat industry." <u>Food Control</u> in press.

Margolis, J. A. (1955). "Comment on the pure theory of public expenditure." <u>Review of Economics and Statistics</u> 37(4): 347-349.

Mariner, J., E. Eulert and P. Ruiz (2004). Development of Participatory Disease Searching as a Tool for Epidemiologic Surveillance for Classical Swine Fever Surveillance in South America. Rome, FAO: 28.

Marsh, W. (1999). "The economics of animal health in farmed livestock at the herd level." Revue Scientifique et Technique 18(2): 357-366.

Martin-Curran, M. and H. G. MacLehose (2002). "Community animal health services for improving household wealth and health status of low-income farmers." Tropical Animal Health and Production 34: 449-470.

Maskey, R. K., D. K. Chung, P. Chuchailam, et al. (1992). Evaluation research on veterinary services in Northeast Thailand under the Basic Animal Health Service of the Thai-German animal health project (TG-AHP): A benefit-cost analysis at farm level -1991. Bangkok, Asian Institute of Technology.

Mathema, V. R. and D. D. Joshi (2000). Livestock and Livestock Insurance in Nepal. Kathmandu, Nepal, Padma Mathema and Ram Narayan Kunj Publishers.

Mays, N. and C. Pope (1999). Quality in qualitative health research. Qualitative research in health care. C. Pope and N. Mays. London, BMJ Publishing Books: 107.

McCorkle, C. (2003). Community-based animal helath workers: The story so far. Community-based Animal Health Workers: Threat or Opportunity? The-IDL-Group. Crewkerne, The IDL Group: 21-42.

McPake, B., L. Kumaranayake and C. Normand (2002). Health Economics. An International Perspective. London, Routlledge, Taylor and Francis Group.

Meade, J. E. (1952). "External economies and diseconomies in a competitive situation." Economic Journal 62(245): 54-76.

Meuwissen, M. P. M. (2000). Insurance as a risk management tool for European agriculture. Department of Social Sciences, Farm Management Group. Wageningen, The Netherlands, Wageningen University: 117.

Mooney, G. (1992). Key issues in health economics. Great Britain, Prentice Hall/Harvester Wheatsheaf.

Morris, R. S. (1999). "The application of economics in animal health programmes: a practical guide." Revue Scientifique et Technique 18(2): 305-314.

Mossialos, E., A. Dixon, J. Figueras, et al. (2002). Funding health care: Options for Europe. Buckingham, Philadelphia, Open University Press.

Mossialos, E. and J. Le-Grand (1999). Health Care and Cost Containment in the European Union. Aldershot, Ashgate.

Mossialos, E. and S. M. S. Thomson (2002). Voluntary health insurance in the European Union. Funding Health Care: Options for Europe. E. Mossialos, A. Dixon, J. Figueras and J. Kutzin. Buckingham, Philadelphia, Open University Press.

Murphy, E., R. Dingwall, D. Greatbatch, et al. (1998). "Qualitative research methods in health technolgy assessment: A review of the literature." Health Technology Assessment 2(16).

Murray, J. L. and J. Frenk (2000). "A framework for assessing the performance of health systems." Bulletin of the World Health Organization 78(6): 717-731.

Musgrave, R. A. (1959). The Theory of Public Finance. New York, McGraw-Hill.

Musgrave, R. A. (1969). Provision for Social Goods. Public Economics. J. Margolis and M. Guitton. New York, St. Martin's Press.

Musgrave, R. A. and P. B. Musgrave (1989). Public Finance in Theory and Practice. New York, McGraw-Hill.

Muurinen, J.-M. and J. Le-Grand (1985). "The economic analysis of inequalities in health." Social Science and Medicine 20(10): 1029-1035.

Nairaud, D. and O. Prunaux (2003). "La renovation du dispositif francais d'analyse des risques sanitaires." Revue Scientifique et Technique 22(2): 433-447.

Nichter, M. (1984). "Project community diagnosis: participatory research as a first step toward community involvement in primary health care." Social Science and Medicine 19(3): 237-252.

Nichter, M. A. (1986). "The primary health center as a social system: PHC, social status, and the issue of team-work in South Asia." Social Science and Medicine 23(4): 347-355.

Normand, C. and R. Busse (2002). Social health insurance financing. Funding Health Care: Options for Europe. E. Mossialos, A. Dixon, J. Figueras and J. Kutzin. Buckingham, Philadelphia, Open University Press.

Ofosu, A. (1983). "National experience in the use of community health workers. A review of current issues and problems." WHO Offset Publication 71: 49pp.

OIE (1924). International agreement for the creation of an Office International des Epizooties in Paris. Done in Paris, 25 January 1924. http://www.oie.int/eng/OIE/textfond/en_arrangement_1924.htm, OIE. 2004.

OIE (1994). Administration et gestion des services veterinaires. Volume I. Specificites des services veterinatires: Elements fondamentaux. Paris, OIE.

OIE (2003). The role of private veterinarians and para-professionals in the provision of animal health services, http://www.oie.int/eng/press/en_030214.htm.

Omondi, F. and O. B. Jerkins (1996). People Profile. The Borana of Ethiopia and Kenya, The virtual research centre.

Orden, D., M. Torero and A. Gulati (2004). Agricultural markets and the rural poor (preliminary draft). Washington D.C., IFPRI.

Ozawa, Y., K. Chang, K. Yoshida, et al. (2003). "The present and future organisation of veterinary services in Asia: the examples of the Republic of Korea and Japan." Revue Scientifique et Technique 22(2): 499-508.

Patton, M. Q. (2002). <u>Qualitative research and evaluation methods</u>, Sage Publications Inc.

Peacock, C. (2004). Contribution to DfID e-Forum, DfID e-Forum 'New Directions for Agriculture in Reducing Poverty' available at: <u>http://dfid-agriculture-consultation.nri.org/maillists/growth-and-poverty/msg00009.html</u>. **2004**.

Pearce, D. (1995). "New directions for financing global environmental change." <u>Global environmental change</u> 5(1): 27-40.

Pearce, D. (1996). "Valuing air pollution damage - Editorial." <u>Energy Policy</u> 24(7): 597-598.

Pearce, D. (1997). "The political economy of the global environment." <u>Scottish Journal of Political Economy</u> 44(4): 462-484.

Pearce, D. (1998). "Cost-benefit analysis and environmental policy." <u>Oxford Review of Economic Policy</u> 14(4): 84-100.

Pearce, D. (2004). "Environmental market creation: saviour or oversell?" <u>Portuguese Economic Journal</u> 3: 115-144.

Peston, M. (1972). <u>Public Goods and the Public Sector</u>. London, Macmillan.

Philipson, T. (1996). "Private vaccination and public health: An empirical examination for the U.S. measles." <u>The Journal of Human Resources</u> 31(3): 611-630.

Pradhan, P., V. Ahuja and P. Venkatramaiah (2003). Livestock services and the poor in Orissa. A case study. Aarhus, Denmark, Danida, IFAD and the World Bank.

Pratt, J. and R. Zeckhauser (1985). <u>Principals and Agents. The Structure of Business</u>. Boston, Harvard Business School.

Precker, A. J., M. Jakab and M. Schneider (2002). Health financing reforms in central and eastern Europe and the former Soviet Union. <u>Funding Health Care: Options for Europe</u>. E. Mossialos, A. Dixon, J. Figueras and J. Kutzin. Buckingham, Open University Press.

Propper, C. (1995). "Agency and incentives in the NHS internal market." Social Science and Medicine 40(12): 1683-1690.

Ramsay, G. C., P. Philip and P. Riethmuller (1999). "The economic implications of animal diseases and disease control at the national level." Revue Scientifique et Technique 18(2): 343-356.

Redmond, E. (2003). Community health workers: Experience formthe field of human medicine. Community-based animal health workers - Threat or opportunity? The-IDL-Group. Crewkerne, The IDL Group.

Reinhardt, U. E. (1990). Economic relationships in health care, in OECD Health care systems in transition: the search for efficiency. Paris, Organisation for Economic Co-operation and Development.

Rice, N. and C. P. Smith (2002). Strategic resource allocation and funding decisions. Funding Healthcare: Options for Europe. E. Mossialos, A. Dixon, J. Figueras and J. Kutzin. Buckingham, Open University Press.

Rifkin, S. B. (1983). "Primary health care in Southeast Asia: attitudes about community participation in community health programmes." Social Science and Medicine 17(19): 1489-1496.

Rifkin, S. B. (1983). "Primary healthcare in South East Asia: Attitudes about community participation and community health programmes." Social science and medicine 17: 1489-1496.

Rifkin, S. B., F. Muller and W. Bichmann (1988). "Primary healthcare: on measuring on participation." Social Science and Medicine 26: 931-940.

Rifkin, S. B. and G. Walt (1986). "Why health improves: defining the issues concerning 'comprehensive primary health care' and ' selective primary health'." Social Science and Medicine 23(6): 559-566.

Riviere-Cinnamond, A. (2004). "Funding animal healthcare systems: Mechanisms and options." FAO-Pro Poor Livestock Policy Initiative Working Paper 17.

Riviere-Cinnamond, A. (2005). Financial support policy strategy for Avian Influenza emergency recovery and rehabilitation of the poultry sector in Vietnam. Hanoi-Rome, FAO: 44.

Riviere-Cinnamond, A. and M. Eregae (2003). Community-based animal health worker in pastoral areas in Kenya: A case study on selection processes, impact and sustainability. Rome - Nairobi, FAO, CAPE, CLIP.

Riviere-Cinnamond, A., M. Paschali and E. Wells (2005). Market exclusion and sanitary standards in livestock value chains: current knowledge and future needs. Rome, FAO: 100.

Robinson, R. (2002). User charges for health care. Funding Health Care: Options for Europe. E. Mossialos, A. Dixon, J. Figueras and J. Kutzin. Buckingham, Philadelphia, Open University Press.

Robinson, S.-A. and D.-E. Larsen (1990). "The relative influence of the community and the health system on work performance - a case study of community health workers in Colombia." Social Science and Medicine 30(10): 1041-1048.

Rubin, R. and D. Mendelson (1995). A framework for cost-sharing polict analysis. Sharing Costs of Health: A Multi Country Perspective. N. Mattison. Basle, Pharmaceutical Partners for Better Health.

Rubyogo, J.-C., P. M. Muriithi, G. Agumbah, et al. (2002). Community-based animal health workeres in Kenya: A case study of Mwingi District. Nairobi, African Union/Interafrican Bureau for Animal Resources.

Ruebush_II, T. K., S. C. Weller and R. E. Klein (1994). "Qualities of and ideal volunteer community malaria worker: A comparison of the opinions of community residents and national malaria service staff." Social Science and Medicine 39(1): 123-131.

Rushton, J., P. K. Thornton and M. J. Otte (1999). "Methods of economic impact assessment." Revue Scientifique et Technique 18(2): 315-342.

Saleh, O. M. and D. Mamis (1999). Les "Docteurs Choukous": vendeurs ambulants de produits veterinaires au Tchad Oriental. Abeche, Republique du Tchad, Ministere de l'Elevage, Direction Generale: 8.

Saltman, R. (1998). Critical challenges for health care reform. Philadelphia, Open University Press.

Samuelson, P. A. (1954). "The pure theory of public expenditure." Review of Economics and Statistics 36: 387-389.

Sandler, T. (1977). "Impurity of defence: An application to the economics of alliances." Kyklos 30(3): 443-460.

Sapsford, R. and V. Jupp (1996). Data collection and analysis, Sage Publications.

Sauerborn, R., A. Nougtara and H. J. Diesfeld (1989). "Low utilization of community health workers: results from a household interview survey in Burkina Faso." Social Science and Medicine (UK) 29(10): 1163-1174.

Schatz, S. P. (1996). "The World Bank's fundamental misconception in Africa." The Journal of Modern African Studies 34(2): 239-247.

Scholl, E. A. (1985). "An assessment of community health workers in Nicaragua." Social Science and Medicine 20(3): 207-14.

Scott, W. R. (1966). "Some implications of organization theory for research on health services." Milbank Memorial Fund Quarterly 44: 35-64.

Seale, C. (1999a). Covering the point? The quality of qualitative research. C. Seale. London, Sage Publications: 53-71.

Segall, M. (1983). "Planning and politics of resources allocation for primary health care: Promotion of meaningful national policy." Social Science and Medicine 17(24): 1947-1960.

Sidibe, A. S. (2003). "Organisation actuelle et future des services veterinaires en Afrique." Revue Scientifique et Technique 22(2): 473-484.

Skeet, M. (1984). "Community health workers: promoters or inhibitors of primary health care?" World Health Forum 5(4): 291-295.

Smith, L. D. (2001). Reform and decentralization of agricultural services: A policy framework,. FAO Agricultural Policy and Economic Development Series. Rome, FAO.

Sones, K. and A. Catley (2003). Primary Animal Healthcare in the 21st Century: Shaping the Rules, Policies and Institutions. Proceedings of an international conference, 15th-18th October 2002, Mombasa, Kenya, African Union/Interafrican Bureau for Animal Resources, Nairobi.

Sringernyuang, L., T. Hongvivatana and P. Pradabmuk (1995). Implications of community health workers distributing drugs. A case study of Thailand. Geneva, World Health Organisation: 51.

Steers, R. M. and L. W. Porter (1983). Motivation and work behaviour. Toronto, McGraw-Hill.

Stern, N. (2002). "Towards a dynamic public economics." Journal of Public Economics 86: 335-339.

Stewart, S. E. (2002). "Community-based animal health training and creative change in Bolivia." PLA-Notes -International-Institute-for-Environment-and-Development 45: 49-53.

Stigler, G. J. (1971). "The theory of economic regulation." Bell Journal of Economics and Management Sciences 2: 137-146.

Stigler, G. J. and C. Fiedland (1962). "What can regulators regulate? The case of electricity." Journal of Law and Economics 5.

Stiglitz, J. E. (1974). "Incentives and risk sharing in sharecopping." Review of Economics and Studies 41(2): 219-255.

Stiglitz, J. E. (1989). "Markets, market failures and development." The American Economic Review 79(2): 197-203.

Stiglitz, J. E. (1998). "The private uses of public interests: Incentives and institutions. Distinguished lecture on economics in government." Journal of Economic Perspectives 12(2): 3-22.

Stiglitz, J. E. (2000). Economics of the public sector. London / New York, W.W. Norton and Company.

Stiglitz, J. E. (2002). "New perspetives on public finance: Recent achievements and future challenges." Journal of Public Economics 86: 341-360.

Stinson, W. (1982). "Community-financing, PHC issues." APHA 1(4).

Stone, L. (1986). "Primary health care for whom? Village perspectives from Nepal." Social Science and Medicine 22(3): 293-302.

Stoufer, K., N. D. Ojha and A. Parajuli (2002). "Village animal health workers in Nepal: the pros and cons of developing a National Skills Test." PLA-Notes - International-Institute-for-Environment-and-Development 45.

Tashakkori, A. and C. Teddle (2003). Handbook of mixed methods in social science and behavioural research. London, Sage Publishing: 299-303.

The-IDL-Group (2003). Community based animal health workers - Threat or opportunity? PO Box 20, Crewkerne, UK, The IDL Group.

Twumasi, P. A. and P. J. Freund (1985). "Local politicization of primary health care as an instrument for development: a case study of community health workers in Zambia." Social Science and Medicine 20(10): 1073-1080.

UK-Government (2003). Food Standards Agency, UK Goverment. 2003.

Umali-Deininger, D., G. Feder and C. deHaan (1992). "The balance between public and private sector activities in the delivery of livestock services." World Bank Discussion Paper 163: 114.

Umali-Deininger, D., C. Narrod and K. Deininger (1994). Private sector development in agriculture: constraints, opportunities and new approaches. Private Sector Development Department, World Bank. Washington D.C., World Bank: 35.

Unnervehr, L. J. and H. H. Jensen (1999). "The economic implications of using HACCP as a food safety regulatory standard." Food Policy 24: 625-635.

Upton, M. and A. Riviere-Cinnamond (2004). The provision of services to the livestock sector - A public choice approach. Background Paper for the Intergovernmental Meeting on Meat and Dairy Products, 15-20 July Winnipeg, FAO.

Vame, B. K. (2003). Rapport de Consultation. Renforcement des Capacites Nationales pour la Surveillance et le Controle Zoo-sanitaires en Cote d' Ivoire. Abdijan, Republique de Cote d'Ivoire.

Van Asseldonk, M. A. P. M., M. P. M. Meuwissen, R. B. M. Huirne, et al. (2003). "European public and private schemes indemnifying epidemic livestock losses: A review." Forthcoming in Livestock insurance products.

Voyle, J. A. and D. Simmons (1999). "Community development through partnership: promoting health in an urban indigenous community in New Zealand." Social Science and Medicine 49(8): 1035-50.

VSF (1998). Privatisation des services aux eleveurs en Afrique de l' ouest et du centre. Table ronde franco-britannique du 16 octobre 1998.

Walsh, J. and K. S. Warren (1980). "Selective primary health care: an interim strategy for disease control in developing countries." Social Science and Medicine 14C: 145.

Walt, G. (1981). "Role of the community health worker." Nurs J India 72(4): 110-1.

Walt, G. (1988). Community health workers: policy and practice in national programmes. A review with selected annotations, EPC-Publication,- Evaluation-and-Planning-Centre-for-Health-Care,-London-School-of-Hygiene- and-Tropical-Medicine: iii + 89pp.

Walt, G., M. Perera and K. Heggenhougen (1989). "Are large-scale volunteer community health worker programmes feasible? The case of Sri Lanka." Social Science and Medicine (UK) **29(5)**: 599-608.

Walt, G., D. Ross, L. Gilson, et al. (1989). "Community health workers in national programmes: the case of the family welfare educators of Botswana." Transactions-of-the-Royal-Society-of-Tropical-Medicine-and-Hygiene **83**(1): 49-55.

WASDA (2000). Supporting pastoral association in Wajir. A manual for development practitioners (Draft report). Wajir, Kenya, The Pastoral Steering Committee, Wajir District.

WASDA (2002). Wajir South Development Association (WASDA) (unpublished). Wajir, WASDA: 6.

Webb, E. J., D. T. Campbell, R. Schwartz, et al. (1966). Unobstructive measures: Non reactive research in the social sciences. Chicago, Rand McNally.

Weisbrod, B. A. (1988). The Nonprofit Economy. Cambridge, Mass, Harvard University Press.

Weller, S. C. (1987). "Shared knowledge: Intracultural variations and knowledge aggregation." American Behavioural Scientist **31**: 178-193.

WHO (1987). The community health worker. Working guide, guidelines for training, guidelines for adaptation, Geneva (Switzerland). WHO. 1987. 463 p.

WHO (1997). "Emerging infectious diseases. World Health Day." Global response - Global alert **WHD 97.1.**

WHO (2003). Health for all in the 21st century - History. **2003.**

Williams, G. and S. Satoto (1983). Socio-political constraints on primary health care: a case stury from Indonesia. Practising Health for All. R. J. a. W. G. Edited by Morley D.: 208-228.

Williamson, O. E. (1979). "Transaction-costs economics: The governance of contractual relations." Journal of Law and Economics 22(2): 233-261.

Williamson, O. E. (1981). "The economics of organisation: The transaction cost approach." The American Journal of Sociology 87(3): 548-577.

Williamson, O. E. (1996). The Mechanisms of Governance. New York, Oxford University Press.

Williamson, O. E. (1998). "The institutions of governance." The American Economic Review 88(2): 75-79.

Wiseman, J. (1960). "The public economy." Economica 27(107): 258-270.

Wiseman, J. (1980). The choice of optimal social expenditures. Public Choice and Public Finance. K. Roskamp. Paris, Editions Cujas.

Woods, P. S. A. (2000). The importance of proximity, transport, and gender as transaction costs in the use of veterinary services in Zimbabwe. Africa's Changing Markets for Health and Veterinary Services. The New Institutional Issues. D. K. Leonard. London, MacMillan Press.

World-Bank (1994). Adjustment in Africa: Reforms, results and the road ahead. New York, World Bank.

World-Bank (1996). Towards the next stages in public enterprise reform in Senegal. Washington DC., The World Bank.

WTO (1994). Agreement on the application of sanitary and phytosanitary measures (SPS), www.wto.org, WTO. 2004.

Zakus, J. D.-L. and C.-L. Lysack (1998). "Revisiting community participation." Health policy and planning 13(1): 1-12.

Zollner, D., P. A. Kohler and K. F. Zacher (1982). The evolution of social insurance 1881-1981. London, Francis Pinter.

Annex 1 - Questionnaire on financing animal health systems

ORDRE DES DOCTEURS VETERINAIRES DU SENEGAL - ODVS

Questionnaire sur le
FINANCEMENT DES PRESTATIONS DE SERVICES EN SANTE ANIMALE

- L'ODVS est en train d'analyser l'organisation du financement des prestations de services en santé animale au niveau national dans plusieurs pays. L'objectif est de mieux comprendre les structures existantes dans chaque pays en relation avec les systèmes de santé animale. Particulièrement l'ODVS s'intéresse à connaître quels sont les services disponibles et comment ils sont financés. La connaissance de ces deux facteurs servira à améliorer le fonctionnement des systèmes de santé appliqué au contexte animal.

- L'information personnelle donnée par les personnes répondant au questionnaire sera traitée de façon totalement confidentielle. Elle ne sera pas mentionnée dans l'analyse des données ou dans le rapport des conclusions. Elle ne sera rendue publique en aucune circonstance.

INSTRUCTIONS

- Le terme «santé animale» inclut:

  1. Les services **curatifs** (diagnostic, surveillance/test de laboratoire et traitement);
  2. Les services **préventifs** (vaccinations, contrôle des vecteurs, éradication de maladies, abattage d'animaux malades, hygiène et inspection des produits animaux, contrôle des zoonoses, restriction/contrôle des mouvements des animaux et quarantaines, sensibilisation et encadrement);
  3. L'approvisionnement en **médicaments vétérinaires.**

- Le questionnaire peut être rempli par une ou plusieurs personnes en fonction de leurs connaissances spécifiques du secteur.

- On vous demande de n'apporter l'information que si vous êtes sûrs des réponses (pas d'estimations).

- Veuillez, s'il vous plait, remplir la grille suivante avec les données demandées, ainsi l'ODVS pourra vous contacter en cas de nécessité.

PAYS	SENEGAL
NOM/S DU/DES PERSONNES REPONDANT AU QUESTIONNAIRE	Confert liste annexée 1
ADRESSE POSTALE	
TÉLÉPHONE	
FAX	
EMAIL	

On vous prie de répondre aux questions suivantes en relation avec le système de santé animale dans votre pays

1. Existe-t-il une (ou plusieurs) **structure publique** qui fournit des **services de santé animale** aux éleveurs? (ex. Services Nationaux de Santé Animale). Précisez le/s **nom/s** de la/des structure/s ou organisation/s et indiquez, si vous le savez, **quand** elle fut créée :

Oui,
DIREL : Direction de l'Elevage

IRSV : Inspection Régionale des Services Vétérinaires
IDSV : Inspection Départementale des Services Vétérinaires
Postes Vétérinaires
Projets avec volet élevage
Sociétés Nationales : PADV, SAED (Riz), SODEFITEX(Coton)

2. Pour chaque organisation ou système mentionné dans la question 1, joindre un organigramme ou équivalent de cette/ces structure/s. L'organigramme devrait montrer les directions/divisions/services. bureaux ou fonctions et les relations hiérarchiques existantes.

3. Veuillez décrire ci-dessous la **déclaration d'intention, les missions** ou l'équivalent (par exemple, le but et les objectifs) pour chacune des organisations ou systèmes mentionnés dans la question 1. Il est possible aussi d'attacher une copie.

Voir organisation DIREL : Arrêté n° 0066473 du 05/ 06/ 2000 portant organisation de la Direction de l'Elevage

4. Veuillez donner une **description** succincte de chaque entité identifiée dans cet organigramme. Veuillez **joindre** un document explicatif si possible.

5. Quelles sont les **taxes, impôts ou prélèvements** qui sont en relation avec l'élevage **ou la santé animale** dans votre pays? Quelle est leur **nature** et quel est le **montant** recueilli pour chacune des taxes? Veuillez cocher les cases concernées et préciser si possible.

5.1	Type de taxe, impôt ou prélèvement	National[48]	Local[49]	Général[50]	Destiné à la santé animale[51]	Montant (citez l'année et la devise)

[48] **Taxes nationales**: taxes, impôts ou prélèvements imposés au niveau national (de façon directe ou indirecte) payés par les contribuables au niveau NATIONAL et qui sont accumulés dans le budget national CENTRAL.

	Taxe				Valeur
Taxe à l'abattoir (payée par l'éleveur à l'abattoir)	☒			☒	Confère Annexe 2
Taxe d'inspection de la viande					
Taxe de marché					
Taxe sanitaire/ certificat vétérinaire					15 000 FCFA/ an
Licence de commerce, patente (taxe)	☒	☒			
Taxe par tête de bétail					100 FCFA /tête
Taxe sur le contrôle/restriction des mouvements des animaux	☒	☒		☒	
Taxe sur l'exportation de bétail					
Taxes sur les médicaments vétérinaires					Impôts& timbres fiscaux
Taxes payées par l'abattoir	☒	☒		☒	
Taxes sur la production de l'exploitation					
Taxes ou impôts sur les profits des industries de la viande					
Taxes ou impôts sur les profits des industries pharmaceutiques					Exonéré
Autres taxes, impôts ou prélèvements (veuillez préciser):					

5.2 Système National de Santé Animale et/ou Système National d'Assurance du Bétail

[49] **Taxes locales**: taxes, impôts ou prélèvements imposés au niveau local (de façon directe ou indirecte) payés par les contribuables au niveau LOCAL et qui sont dirigés vers le budget gouvernemental LOCAL exclusivement. L'argent collecté reste LOCAL et n'est pas envoyé au budget national central.

[50] **Taxation générale**: le ministère des finances assigne ou attribue un montant qui est obtenu de la taxation nationale, de taxes directes et/ou indirectes, des autres ministères depuis le budget national CENTRAL.

[51] **Taxes destinées à la santé animale ou l'élevage**: taxes, impôts ou prélèvements (directs ou indirects) dirigés exclusivement pour des activités en relation avec les services de la santé animale ou le bétail (c'est-à-dire qu'ils ne sont pas mélangés avec le budget national central). Ces taxes peuvent exister tant au niveau local qu'au niveau national.

5.2.1	Existe-t'il une organisation au niveau national[52] avec les caractéristiques suivantes: (i) les taxes sont **obligatoires** et elles sont (ii) **assignées et gérées par une caisse nationale** (donc pas directement gérées par le ministère), qui prenne en charge:
	☐ Santé animale
	☐ Assurance du bétail
	☐ Les deux
	☒ N'existe pas (allez directement à la question 5.3)
5.2.2	**Système National de Santé Animale** **Système National d'Assurance du Bétail**

Système National de Santé Animale

Si une telle structure existe, d'où est-ce que les **fonds arrivent?**
Est-ce à partir de:

☐ Une taxe ou impôt **obligatoire** prélevé **par animal**.
Dans ce cas de figure, comment est calculée la taxe? Est-ce:
☐ Un montant fixe[53]
☐ Un pourcentage sur le prix de l'animal.
Précisez lequel:

☐ Autres (veuillez préciser):

☐ Contributions **obligatoires** pour les éleveurs ou producteurs
Dans ce cas de figure, comment sont-elles calculées? Est-ce en relation au:

☐ Nombre d'animaux
☐ Espèces
☐ Races
☐ Nombre d'animaux abattus
☐ Bénéfices ou profits obtenus par l'éleveur ou producteur. Précisez cette relation:

Système National d'Assurance du Bétail

Si une telle structure existe, d'où est-ce que les **fonds arrivent?**
Est-ce à partir de:

☐ Une taxe ou impôt **obligatoire** prélevé **par animal**.
Dans ce cas de figure, comment est calculée la taxe? Est-ce:
☐ Un montant fixe
☐ Un pourcentage sur le prix de l'animal.
Précisez lequel:

☐ Autres (veuillez préciser):

☐ Contributions **obligatoires** pour les éleveurs ou producteurs
Dans ce cas de figure, comment sont-elles calculées? Est-ce en relation au:

☐ Nombre d'animaux
☐ Espèces
☐ Races
☐ Nombre d'animaux abattus
☐ Bénéfices ou profits obtenus par l'éleveur ou producteur. Précisez cette relation:

---

[52] Il existe une troisième caractéristique pas toujours présente: les **contributions ne sont généralement pas liées au risque mais aux revenus. Dans le domaine animal/bétail, ce type d'assurance ou systèmes peuvent être trouvés dans, par exemple, le contexte d'une «Caisse Agricole Nationale».**
[53] Indépendant du prix de l'animal.

	☐ Autre (veuillez préciser):
	☐ Autres types de taxes ou contributions obligatoires. Veuillez indiquer:

☐ Autre (veuillez préciser):

☐ Autres types de taxes ou contributions obligatoires. Veuillez indiquer:

5.2.3	Veuillez préciser qui recueille l'argent, où, selon quelles fréquences et en **quelles occasions**:
5.2.4	S'il y a plus d'un/e agent/structure qui est chargé/e de recueillir l'argent, veuillez préciser quelle est leur relation:
5.2.5	**Comment sont canalisés les fonds?** Est-ce à travers: ☐ Autorités locales ☐ Autorités régionales ☐ Gouvernement central ☐ Une combinaison des précédents. Veuillez préciser quelles structures en font partie et comment elles sont en relation.

☐ Autres (veuillez préciser):

5.3 Paiement en comptant [54] (dans le contexte du secteur public)

☐ Paiement par consultation
☐ Paiement par traitement
☒ Paiement pour diagnostics ou tests de laboratoire
☒ Paiement pour les vaccins
☒ Paiement pour les médicaments vétérinaires
☐ Autres (veuillez préciser):

[54] **Paiement en comptant**: fait référence au paiement fait par l'éleveur ou le producteur au point d'utilisation du service public qui n'est donc pas totalement exempte de charges/paiement.

5.4 ☐	**Aide au développement** national, international et/ou privé [55]
5.4.1	**Qui** sont ces donateurs ? (veuillez préciser leurs noms et les années): Dans le cadre des Projets d'élevage. Banque Mondiale (1999) Banque Ouest Africaine du Développement BOAD (2000) FAC (1997& 1998) Fonds Africain de Développement FAD (1997& 1998) Fonds Européen du Développement FED(1997 à 2001) Fonds International pour le Développement Agricole FIDA (2000&2001) USAID (1999)
5.4.2	Si les donations sont monétaires, quel a été le **montant** offert pendant les **derniers 5 ans**? (Veuillez préciser la devise et l'année): ND
5.4.3	Si les donations étaient sous forme de **biens ou services**, quels biens ou services ont été donné pendant **les derniers 5 ans** ? (précisez les années) • Biens matériels • Service sous forme d'assistance technique

[55] Soient-elles régulières (chaque année le même ou similaire montant par le même donateur) ou irrégulières.

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DONNEES NATIONALES

- Indiquez votre pays: **Sénégal**

- Précisez la **devise** et si les données économiques ont été ajustées a l'**inflation annuelle**:

Franc CFA, inflation est très faible et les données sont en prix courant

- **Précisez la/les sources des données:**

Ministère des Finances et de l'Economie du Sénégal
  - Direction de la Prévision et des Statistiques (DPS)
  - Direction de la Coopération Financière et Economique (DCFE)
Ministère Délégué chargé de l'Elevage
Direction de l'Elevage du Sénégal
Les Abattoirs de Dakar
Ordre des Docteurs Vétérinaires du Sénégal
Personnes ressources

- Veuillez remplir le tableau suivant POUR LES DERNIERS 5 ANS DONT VOUS AVEZ DES DONNEES DISPONIBLES
- Et veuillez PRECISER LES ANNEES SUR CHAQUE COLONNE

	Années				
	1999	**2000**	**2001**	**2002**	**2003**
PNB agricole	279	328, 8	374,7	343,3	352,7
	162	196,4	223,6	222,7	232,5
% de la contribution du secteur de l'élevage au PNB agricole	6,7	6,6	6.4	5,6	5,5
Budget total du gouvernement (milliard de FCFA)	ND	ND	842,5	938,7	985,5
Dépenses Publiques en Services de Santé Animale et en élevage (millions de FCFA)	6 551,63	7 457,49	34 697,48	12 009,03	ND
	ND	780	1025	1227	563
Dépenses Privées en Services de Santé Animale[56] et en élevage(millions de FCFA)	59,582090	49,99998	29.99998	ND	ND
Paiements en comptant pour les Services de Santé Animale et en élevage					
Contributions des Bailleurs de fonds aux Services de Santé Animale et à l'élevage(millions de FCFA)	ND	298	697	1164	3207

Rouge : A prix contant

[56] «Dépenses privées en santé animale» fait référence aux paiements faits a une entité privée qui fourni des services de santé animale aux producteurs ou fermiers, comme par exemple les coopératives ou association de fermiers (les fermiers paient une certaine somme en échange d'un forfait standard de services pendant une période de temps déterminée).

Bleu : Budget d'investissement
ND : Non disponible

Nom et prénoms	Structure	Contacts
Moustapha M. BA	Ministère de l'Economie et des Finances du Sénégal (DCEF)	2ème étage Bur. 208
Doudou MANE	Direction de l'Elevage	
M. BOURSICOT	Ministère de l'Economie et des Finances du Sénégal (DSP)	Rez de chaussée
Latif DRAMANI	Ministère de l'Economie et des Finances du Sénégal (DSP)	1er étage Bur. 8
Magamou M'BAYE	Ministère de l'Economie et des Finances du Sénégal (DSP)	Rez de chaussée
Dr Sadibou FALL	Ministère de l'Elevage	
Serigne A. GUEYE	Abattoir de Dakar	854 07 60
Mme Ndèye Binta DIENG	Ordre des Docteurs Vétérinaires du Sénégal	832 24 41

Taxe de stabulation : 90 FCFA/ tête de bovin et 50 FCFA / tête de petit ruminant ou de porc
Taxe d'abattage : 48 FCFA/ kg
Taxe de ressuyage : 4 FCFA/ kg
Taxe de stockage : 7 FCFA / kg de bovin et 300 FCFA / petit ruminant
Timbre payé:
  - 1à 1000 t   : 20 FCFA
  - 1001 à 10 000 t :150 FCFA
  - 10 001 à 50 000 t   : 200 FCFA

PS :
Il serait souhaitable de dissocier les dépenses publiques de l'Etat en dépenses d'investissement et de fonctionnement

Annex 2 - Community-based AH projects reviewed for Chapter 4

Start project	Country/Areas	Name given to the worker	Entity/ies involved in the project	Funding sources for workers	Num. workers trained	Source
1994	Afghanistan (Daye Chopan)	Basic Veterinary Workers	Vet Aid	▪ Training provided by Vet Aid ▪ Earnings from profit made from drug selling	Not available	T. Leyland (Leyland 1994)
1993	Malawi (Northern)	Village Keymen	Mzuzu Agricultural Development Division (Division of Veterinary Office)	▪ Drug revolving fund	33	K. Huttner et al. (Huttner, Leidl, Pfeiffer et al. 2001)
Early 1990s	Ethiopia	CAHWs	Government of Ethiopia and NGOs (not specified)	▪ Training provided by the government and NGOs ▪ Source of earnings for the worker not specified	1500	B. Admassu (Admassu 2003)
1992	Somaliland (Sanaag area)	CAHWs	Action Aid/Vet Aid	▪ Training provided by MoL ▪ Revolving drug fund (community)	30	A. Catley (Catley 1999)
1986	Somaliland	Nomadic Animal Health Assistant	GTZ	▪ Government managed revolving drug fund	54	A. Catley (Catley 1999)
1995	Somali National Regional State	CAHWs	Save The Children UK	▪ Revolving drug fund	45 (27 left in1996)	A. Catley (Catley 1999)
1994	Kenya	Daryelles	Oxfam UK/ Wajir Development Project	▪ Pastoral Association	87	A. Catley (Catley 1999)
1996	Southern Sudan	CAHWs	UNICEF / Operation lifeline Sudan	Not available	563	A. Catley et al. (Catley, Delaney and McCauley 1998; Catley and Leyland 2001)
1993	North and South Kordofan States	CbAHWs	IFAD/OLS/Tufts University/NGOs	▪ Given basic drug kit ▪ Small initial grant to purchase drugs ▪ Fee-for-service	234	IFAD (IFAD 2004a)
1994	Ethiopia (Afar region)	CAHWs	PARC	▪ Profits made from drug selling	20	A. Catley et al. (Catley, Delaney and McCauley 1998;

Start project	Country/Areas	Name given to the worker	Entity/ies involved in the project	Funding sources for workers	Num. workers trained	Source
2001	Southern Sudan	CAHWs	Operation Lifeline Sudan	Not available	1400	B. Jones (Jones, Araba, Koskei et al. 2002)
1981	Nepal	Village Animal Health Workers	United mission to Nepal	▪ Paid by Nepalese government	2000	K. Stoufer et al. (Stoufer, Ojha and Parajuli 2002)
1996	Indonesia (Sumatera)	CAHWs	Government of Indonesia in collaboration with DfID - DELIVERI project	▪ Fee for service ▪ 'Soft loans' from the district veterinary service	161	C.S. Leksmono (Leksmono and Young 2002)
1984	Thailand	Village Keymen	Government (Department of Livestock Development) with assistance of GTZ	▪ Training and extension provided by the government of Thailand ▪ Drug supply through revolving fund	2100	GTZ (GTZ 1992)
1998	Cambodia	Village Animal Health Workers	IFAD and the Government of Cambodia	▪ VAHWs associations ▪ District cooperative pharmacies (membership contribution) ▪ Fee-for service	6129 (IFAD contributed to the training of 1120)	IFAD (IFAD 2004b)
1991	Bolivia	CAHWs	Local farmers' organisations, a local NGO (Fundacion Integral de Desarrollo), and internacional NGOs (World Concern /Christian Veterinary Mission and Heifer Project Internacional)	Not available	1500 villagers and 24 CAHWs	S.E. Steward (Stewart 2002)
1998	Peru (Puno)	Sanitarios Ganaderos	CARE-Puno	▪ Start up kits with credit Asociación de Sanitarios Ganaderos (membership organisation)	14	CARE-Peru (CARE-Peru 2001)
1993	Ghana	Community	IFAD, ActionAid		1007 trained	Hanks et al. (Hanks,

Livestock Worker		(54 of them evaluated)	Oakeley, Opoku et al. 1999)

Annex 3 - Questionnaire for livestock keepers and policy makers

- **Livestock Keepers Group Questionnaire**

Key questions regarding the selection process
1. Who was the last person to be eligible to be a CAHW?
2. What were the criteria needed for his or her selection?
3. In your point of view, identify as many qualities as you can that you would like to see in a CAHW.
4. Rank the qualities in order of importance.
5. State the reason why you have chosen these qualities.
6. Were you consulted about the selection?
7. Who chose the candidates? *The whole community, selected members of the community, the authorities, others?*
8. Were the candidates appointed by the authorities and presented to you/ the community?
9. Did you know/were you familiar with the candidates?
10. Were you aware of the decisions taken? *If yes, how did you know/ who told you?*
11. How do you think the selection process could be improved?
12. How the last appointment was made?
13. Is there anything else you would like to say about the process?

Key questions regarding the effectiveness and sustainability of CAH systems
1. Do you think CAHW are useful?
   Please explain how and give illustrations of cases in which they have helped.
2. Are there any examples in which they were not able to contribute because of lack of training, skills or supplies?
3. Have you noticed an improvement in the animals' health?
   If yes, in what way?
4. What improvements could be made to the system?
   Explain with examples
5. How many have left in past XX years?
6. How long on average do they stay?
7. Why do you think they leave?
8. Do you know why the last person left?
9. What could encourage them to stay? What are the incentives that could be used for encouraging CAHW to stay?
   Give examples
10. Have they passed on their skills to others? What has the community learnt from the CAHWs? *Give examples*

- **Policy Makers Group Questionnaire**

Key questions regarding the selection process
1. As a veterinarian in your current position, what would be the qualities you would like to see in a CAHW? Please identify up to 11 qualities (or as many as you can) that you would like to see in a CAHW.
2. Please rank the qualities you have stated in terms of importance.
3. Explain why you have chosen these qualities (for the first 5).
4. Do you have field experience with CAH systems?

- *If 'yes',*
a.   For how long?
b.   Where?
c.   While in the community, did you spoke with any CAHW?
d.   In your point of view, what the role of a CAHW should be?
e.   In the community you were involved, how was the selection process done?
f.   What were the strengths and weaknesses of the process?
g.   Was the whole community involved?
h.   Were there women involved?
                    - If no, do you know why?
                    - If yes, how were they involved/ what was their role?

- *If 'no'*, explanation of the selection process of CAHW => CAHW can be selected by the whole community, selected members of the community or the authorities. Who do you think would theoretically be more suitable for the selection process?

5. Do you think CAH systems are good/ useful? (yes/no)   Why?
6. With this study we are trying to see if a link between CAH systems and the private (veterinary) sector could exist.
   Do you think there is any contradiction between what the communities want and what the private sector wants?
7. Is there anything else you would like to say about the process?

Key questions regarding the effectiveness and sustainability of CAH systems
To date several CAH systems have been implemented. However, after the initial financial help pulls out, some of these systems are not anymore sustainable as CAHWs might drop out. The fact is that different projects have different CAHWs drop out rates.

1.   Why do you think CAHWs leave?
2.   What do you think is the incentive for a CAHW to continue working as a CAHW?
(For example: social status, recognition among the community, financial, others...)
3.   Do you know what they do after leaving? If 'yes', what?
4.   Why do you think a livestock keeper would go to a CAHW instead of other suppliers?
5.   Who are these other possible suppliers of services for the livestock keeper?
(For example: traditional healers, black market, dukas, drug stores, others?)

6. Why do you think they are competitors of the CAHWs?
7. How do you think this could be solved?
8. Should there be any support from the government or private vets for the CAH system? Why?
9. How do you think CAH systems could be improved?
10. Is there anything else you would like to add regarding the effectiveness and sustainability of CAH systems?

Annex 4 - Description of the field study locations

Three Districts were selected for the interview process: West Pokot, Wajir and Marsabit. Reasons for selecting these three geographical areas were (i) that the three districts were representative of ASAL areas in Kenya, (ii) the lack of infrastructure and poor service delivery in those areas and (iii) the ongoing CAH programmes run by different NGOs.

Kenya
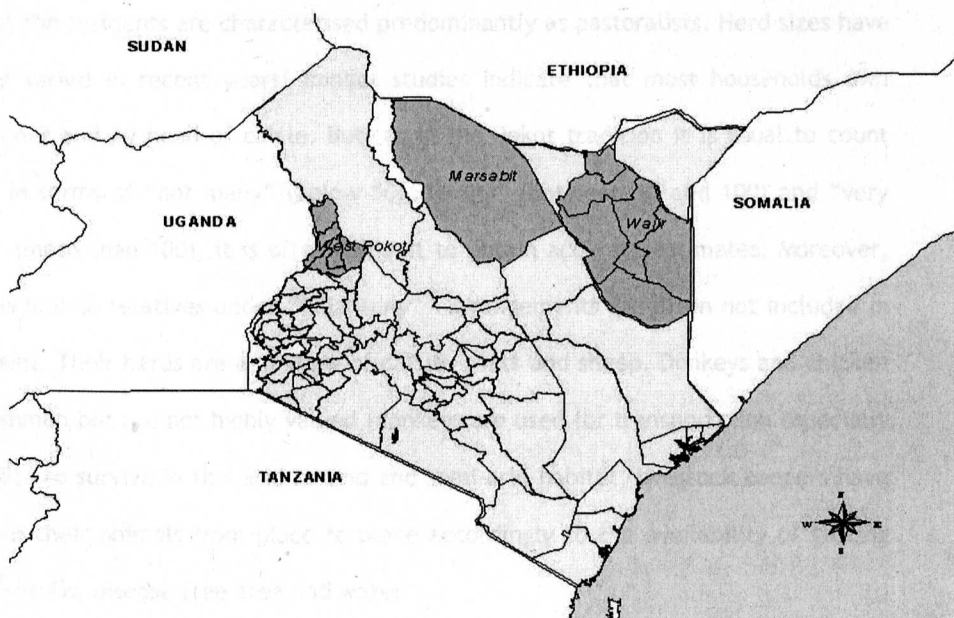
Map 1: Locations of West Pokot, Wajir and Marsabit districts

Specific NGOs working in these districts were identified with the help of ITDG's Community-based Livestock Initiative Programme (CLIP). The criteria for selection were based on (i) the available connections of CLIP with field NGOs and (ii) the perspective taken by the field NGO regarding the implementation of CAH systems.

The perspective selected was towards "business oriented" CAH programmes. This choice was made based on criteria of sustainability of CAH systems. Given the current low government funds available for animal health service delivery, business oriented community-based programmes are believed to contribute to the system's sustainability after the NGO pulls out or available funds for the project are over.

• West Pokot

Annual rainfall is critical to the food production of the district in order to support its population. Rangelands and marginal areas (72%) are the most affected by rainfall variations. Drought appears commonly each 5 - 7 years. Livestock is essential for the subsistence of the Pokot people in the low land areas of the district as almost one third of the residents are characterised predominantly as pastoralists. Herd sizes have greatly varied in recent years. Impact studies indicate that most households own between 2 and 20 head of cattle. But, as in the Pokot tradition it is usual to count cattle in terms of "not many" (below 10), "many" (between 10 and 100) and "very many" (more than 100), it is often difficult to obtain accurate estimates. Moreover, animals lent to relatives under "Tiliantany"[57] arrangements are often not included in the count. Their herds are a mixture of cattle, goats and sheep. Donkeys and chicken are common but are not highly valued (donkeys are used for transportation especially of food). To survive in this arid to arid and semi-arid habitat, livestock keepers have to move their animals from place to place accordingly to the availability of grazing lands, shrubs, disease-free area and water.

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[57] *Tiliantany*: is an "insurance system" among pastoralists. Pokot minimise the risk of complete loss of livestock through "loaning" cows to relatives and friends in other parts of the district in exchange of steer. The cow provides milk for the person who receives it, but calves are property of the original owner. Loaning cows to other people gives prestige to the pastoralist and more importantly it gives him the right to claim assistance from his "tiliantany" partners when needed.

West Pokot

Alale

Turkana

Uganda • Kasei

Kodich

Ortum

Kacheliba

Cheporeria • Lelan

Kapenguria

Tranznzoia

Elgeyo Marakwet
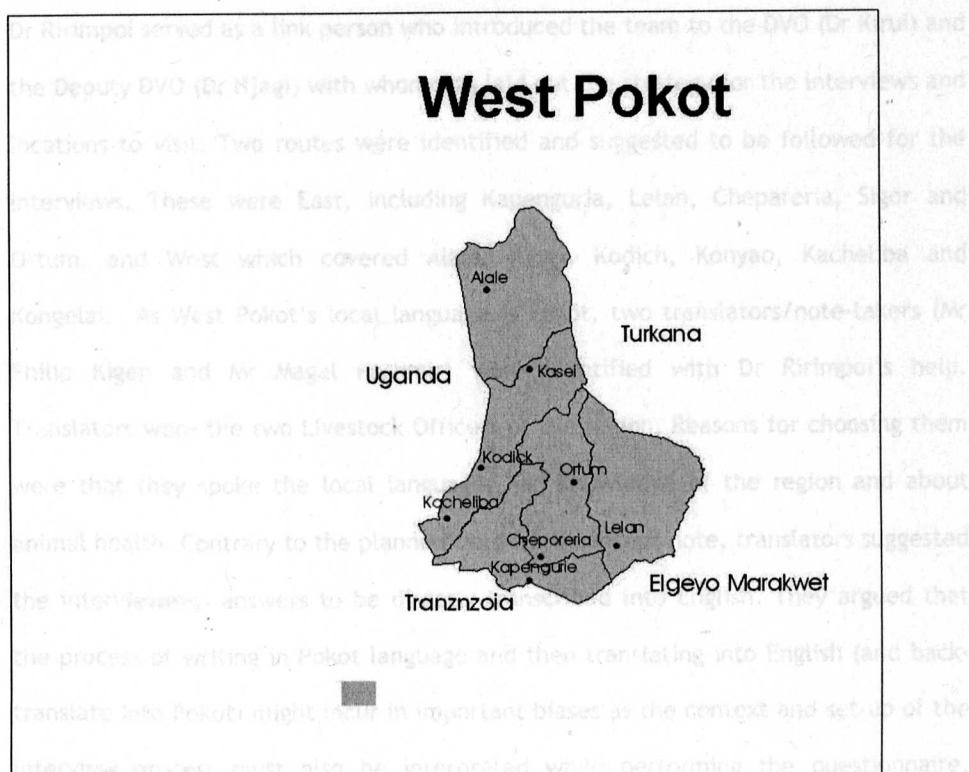
Map 2: West Pokot District

The contact person in West Pokot was a private veterinarian (Dr Ripimpoi) who had started an agrovet store in Makutano in 2001 under the privatisation scheme supported by the AU - IBAR CAPE Unit. The background of the project goes back to 1997 when the predecessor to CAPE (called the 'PARC-VAC Project' of AU-IBAR) in collaboration with the district veterinary services, started an initiative on CAH delivery services based in Alale (Northern part of the district). In 1999, SNV, a Swedish NGO, took over the project until 2002. Meanwhile, other NGOs in the district stated to implement CAH components in their programmes (as for example WVK, ELCK, Ortum PHCD, Sigor NRM and KEDDA). In 2002, as SNV was not able anymore to sustain financially the project, a collaboration with the AU-IBAR CAPE Unit was made. The objective of the two partners was to enhance the privatisation process of CAH systems under the supervision of a private veterinarian while supplying drugs and giving advice.

Dr Ririmpoi served as a link person who introduced the team to the DVO (Dr Kirui) and the Deputy DVO (Dr Njagi) with whom was laid out the strategy for the interviews and locations to visit. Two routes were identified and suggested to be followed for the interviews. These were East, including Kapenguria, Lelan, Chepareria, Sigor and Ortum, and West which covered Alale, Kasei, Kodich, Konyao, Kacheliba and Kongelai. As West Pokot's local language is Pokot, two translators/note-takers (Mr Philip Kigen and Mr Magal Kashmir) were identified with Dr Ririmpoi's help. Translators were the two Livestock Officers of the region. Reasons for choosing them were that they spoke the local language, had knowledge of the region and about animal health. Contrary to the planned field work concept note, translators suggested the interviewees' answers to be directly transcribed into English. They argued that the process of writing in Pokot language and then translating into English (and back-translate into Pokot) might incur in important biases as the context and set-up of the interview process must also be interpreted while performing the questionnaire. Following this logic, in the two other district studied, translators were also English note-takers.

- **Wajir**

Wajir district is situated in the North Eastern Province. It covers an area of 56,599 square kilometres and has borders with Ethiopia and Somalia, and the Kenyan districts of Mandera, Garissa, Isiolo and Marsabit. The population the district, and in the whole Northeastern Province, is predominantly Somali. In Wajir there are clans of Kenyan Somalia: Ajuran, Degodia and Ogaden. Rainfall is unreliable and averages about 200mm per year. Drought is periodic, occurring most recently in 1996-7, 1991-2, and 1984. Pastoralism in the district has been subject to constant changes and adaptation. These processes have been accelerated in the past 50 years due to an increase in the number of water points, settlements and the livestock and population growth. The backbone of the economy in Wajir is nomadic pastoralism. Wajir is based on herding of camels, cattle, sheep and goats. Most of the pastoralists remain nomadic and movement is dictated by the availability of grazing and water.
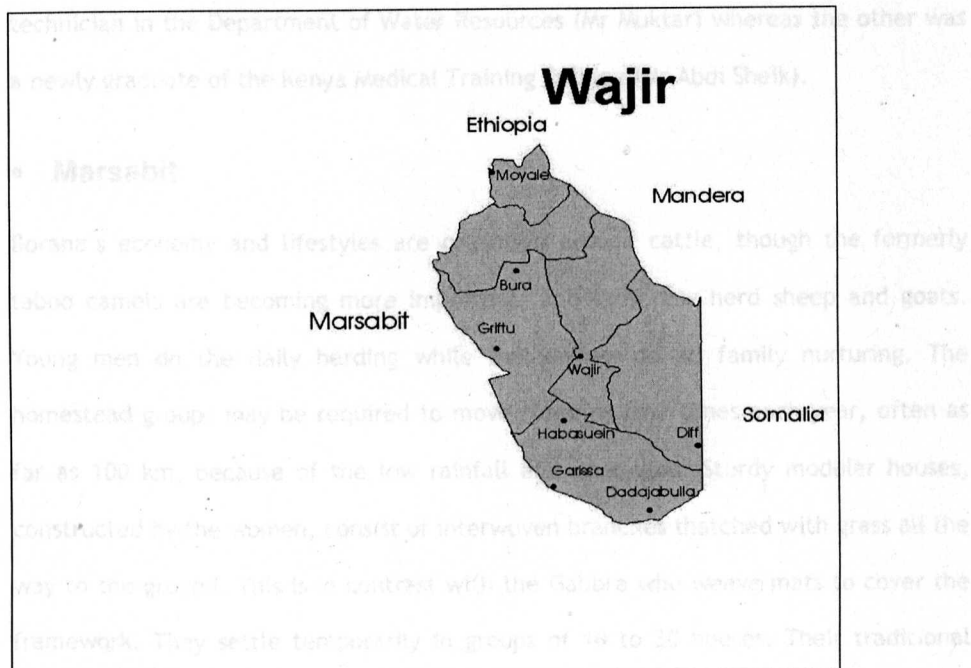
Map 3: Wajir District

The field NGO contact was WASDA (Wajir South Development Association). WASDA was created in 1993 by professional and business persons from Wajir South operating within and outside the district. It is a non-profit making organisation, which supplements Kenyan government efforts in development. It aims to support the improvement of livelihoods of pastoral communities in Wajir District and lower Juba in Southern Somalia. WASDA operates in pastoral areas where communities are highly dependent on livestock for their social and economic well being. These areas are highly vulnerable to unpredictable climatic changes and are constantly faced with drought, epidemic diseases in livestock and conflicts (WASDA 2002).

A multidisciplinary board member and staff run the organisation. The board has the role of policy making and the management has the task of implementing. Its mission is the "improvement of quality of life of pastoral communities in Wajir and its environs with respect to livestock, human and water development in an

environmental friendly way". Two translators/note-takers were recruited with the assistance of Mr. Abdinoor (WASDA Co-ordinator). One of the translators was a water technician in the Department of Water Resources (Mr Muktar) whereas the other was a newly graduate of the Kenya Medical Training College (Mr Abdi Sheik).

• **Marsabit**

Borana's economy and lifestyles are organised around cattle, though the formerly taboo camels are becoming more important, and they now herd sheep and goats. Young men do the daily herding while the women do all family nurturing. The homestead groups may be required to move three or four times each year, often as far as 100 km, because of the low rainfall and poor land. Sturdy modular houses, constructed by the women, consist of interwoven branches thatched with grass all the way to the ground. This is in contrast with the Gabbra who weave mats to cover the framework. They settle temporarily in groups of 10 to 30 houses. Their traditional religion is monotheistic with communication through intermediary priests or "Qalla". The traditional name for God is Waq (or Wak). Islam has become influential in Borana society in the last 70 years. Borana people have had only minimal contact with Christianity, due in part to their nomadic life style. Yet an indigenous church exists and about 10% of the Borana are Christian (Omondi and Jerkins 1996). Regarding Gabbra customs, polygamy is accepted but rare. The family is the foundation of society. The Gabbra make round houses of bent pole frames covered with skins and grass mats. Up to 25 houses make up an "olla" (village) of up to 75 people. Ten to 15 families in a village is common. Women do the packing and unpacking of the house at moving time. The men care for the animals. Gabbra religious beliefs are inseparably linked to their herds. Animals are more than food: they are needed for sacrifice to ensure fertility, health and co-operation from spirits. Muslim influence is stronger in some areas than others. They traditionally believe in one God, whom they call Waka. The religious attachment between Boranas and Gabbras is maintained through the qallu or holy men whom they recognise between groups. The lifestyle of Gabbra has limited contact with Christian influences (Jerkins and Anonymous 1996).

Map 4: Marsabit District

The NGO Community Initiative Facilitation Assistance (CIFA) branch on livestock health and production branch operates in Marsabit, Maikona and Nort Horr while in Moyale district it operates in Obbu, Uran and Central division. After the severe drought of 2001, a PRA (participatory rural appraisal) was conducted in conjunction with the animal health service providers of the area in order to identify the needs of the communities. The objective of the programme was to achieve sustainability through (i) improving the accessibility of services and veterinary drugs in the area, (ii) develop communities' skills in viable business, (iii) establish professional supervised system of CAH programme using state veterinary services, (iv) strengthen animal health provider's forum to enhance harmonisation and (v) implementation approaches and to enhance dialogue with policy organisations and government to influence government policy regarding animal health services" (CIFA 2002).

Annex 5 - Case study interview process

- **West Pokot**

The study areas were identified on the basis of ongoing CAH projects in West Pokot district. The district was divided into two sections, based on geographical location i.e. West and East. Semi-structured questionnaire was first tested in Alale (see annex 4 for West Pokot map). The test pointed out that the questionnaire was only possible to perform with those LK who were knowledgeable or had been in contact with CAH structures. Thus, changes in the itinerary were made, alongside some minor modifications to the questionnaire. The latter was carefully explained to the two chosen Pokot translators by going through each of the questions with the research assistant so that no misunderstanding or misinterpretation could arise.

With regard to translation, it was initially planned that the note-takers would write in Pokot language. Consequently, the Pokot text will be translated into English and back translated into Pokot to crosscheck about the accuracy of the initial translation. However, when explaining the process to the Pokot translators, it became evident such process was not possible to perform. Translators argued that the process of writing in Pokot language and then translating into English (and back translating into Pokot) might incur in important biases as the context and set-up of the interview process must also be interpreted while performing the questionnaire. Consequently translators suggested the interviewees' answers to be directly transcribed into English. Following this logic, in the two other districts studied, translators were also English note-takers.

The areas covered in the West were Kutung, Kacheliba, Kasei, Kamketo, Kodich, Kongelai, Konyao, Alale and Nasal. In the East Kapenguria, Ortum, Chepareria and

Sigor areas were visited (see annex 4). When arriving to each community the two translators introduced the research team and its purpose through a general meeting. Then, generally with the help of the chief or community elder, respondents were chosen. Criteria used to sample candidates were age, gender, literacy and status (i.e. CAHW or not) so as to obtain a balanced sample. The interviewees were therefore community members, livestock keepers and CAHWs (total of n=72). However, participation of women in the interviews was low (n=8) as they were not willing to participate (for cultural reasons).

• Wajir

In Wajir district, the fieldwork started with initial planning in Wajir at the NGO WASDA[58] office where the areas to be visited were selected. As part of planning process, visits to Government Veterinary Department and other NGOs related to delivery of AH service delivery in the district were included. OXFAM and ALDEF[59] were visited. However, other NGOs present in the area (as NPHC[60], VSF[61], Arid Lands) were not visited mainly because of the particular period of the year when the fieldwork was performed (i.e. Ramadan), as it was difficult to find the NGO staff during daytime.

In order to obtain a representative sample of Wajir, the district was divided into Northwest, South, and East. Centres with existing CAH delivery systems were targeted during the exercise. Interviews started in the East and the communities covered include Wajirbor, Riba and Kharof-harar. This was followed by a visit to the South where interviews were conducted at Lagbogol, Habasweni, Abakore and Dadajabula. Interviews concluded in the Northwest with questionnaires performed in Hadado, Garsekoftu, Griftu and Buna areas (refer to annex 4 for locations).

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[58] WASDA: Wajir South Development Association
[59] ALDEF: Arid Lands Development Facility
[60] NPHC: Nomadic Primary Health Care
[61] VSF: Veterinaires Sans Frontieres

The same technique as in West Pokot was used to introduce the research team and the purpose of the study. Therefore the two Somali translators went through the village chief or elder to explain the interview process. It should also be highlighted that the period of time in Wajir district overlapped with parliamentary regional elections (21 November 2002). This caused sometimes a first misunderstanding from the communities visited as they thought the research team was made of election campaigners. There was also some tension in the district, especially in the South, as result of unrest that characterises the election process.

Taking into account the particularities of Wajir district, livestock keepers, community members and CAHWs were interviewed, and also officials of the Pastoral Associations, as this a characteristic feature of development projects in the area (n=59). It should be noted that the participation of Somali women was the lowest in comparison to the other two districts. Only two women were interviewed in the district.

- **Marsabit**

The planning process was organised with the assistance of the NGO CIFA. The areas selected to perform the field study were Kalacha and Hurri Hills as these were CIFA's areas of operation, therefore familiar with CAH systems (although other NGOs as Farm Africa and VSF were working in the same areas as CIFA). As for the other districts, two Borana translators were selected. The first was hired at Marsabit town and the second at Kalacha centre. Translators were slow in conducting the interviews and this necessitated the hiring of a third translator while in Kalacha centre. Two of the translators were primary teacher trainees and one was a form four leaver. Compared to the other two districts, these translators were less competent and it was therefore expected that the quality of their work might have been compromised. It should also be noted that the translators were much

younger than those in previous districts and more importantly, they had no knowledge on CAH systems.

The research work started at Kalacha area where interviews were conducted at Rage, Dibukutura, Arerite and Elgade villages. Hurri Hills area was covered last and fieldwork was done at Jaldesa, Baqaqa, Ali Boru, Olla Guba, Olla Konso and Olla Darga (see map in annex 4). As in the previous districts, translators introduced the research team and its purpose, but this time in an individual basis given that the size of the communities was much smaller than in the previous two districts. Livestock keepers, CAHWs and community members were interviewed (sample size of n=58). It should also be highlighted that there was a marked participation of women in the interviews (n=18) with a few women CAHWs also involved.

• Policy makers group

The semi-structured questionnaire for the PM group was performed on a one-to-one basis. The research assistant was also present during the interview sessions. The principal investigator mentioned the organisations involved in the research project and presented the general purpose of the research study trying not to influence the respondent's opinions. The principal investigator was the interviewer and the note-taker.

Annex 6 - Further results from semi-structured interviews

- **Livestock keepers group**

Selection process

Referring to the selection process in the districts, the majority of the interviewees in Wajir and Marsabit were consulted regarding the selection (76.27% and 66.6% respectively). However in West Pokot 55.5% of the respondents were not consulted. These include mainly women and young men and the stated reason was that they were "not allowed" to participate. Candidates were selected by the whole community in Marsabit (96.5%), however in West Pokot elders, opinion leaders or selected members of the community were often the ones choosing the candidates. In Wajir, respondents stated the whole community made the choice in 50% of the cases and selected members of the community in 45.7% of the cases. Nearly all respondents in the 3 districts were familiar with the candidates. In West Pokot and Wajir, the 38.9% and 41.4% of the interviewees respectively were not aware of the decisions taken during the process but were informed of the result by the elders of the community. In Marsabit, community members were only informed of the final decision taken through a community meeting (34.5%) and through a meeting with the NGO (22.4%).

When asked about how to improve the selection process members of the Pokot communities interviewed suggested the involvement of the black market seller and traders ("they should be trained as they deal yet with drugs"). Other suggestions included the increase in the involvement of women in the selection process and as potential candidates to become CAHWs as "they are most of the times with animals - goats, sheep and calves- and they are crucial for the cleanness of cows and cattle

and key elements in milking". It was also highlighted that "they should be able to administer drugs to animals". Special attention was given to the criteria used in the selection process and to the need of more CAHWs. It was markedly noted that selection criteria should be made public and should be available for all community members. In order to increase fairness to the process, chiefs or authorities should not be involved and an interview should be included during the selection process of the candidates.

The communities in Wajir did also highlight the need for instituting a clear selection process with specific criteria and guidelines. The need to increase participation of women was a recurrent theme, as well as the involvement of the whole community in the selection process, not letting the candidates be selected exclusively by the elders, leaders or Pastoral Association officers. Again, the ideas of including an oral interview of the candidate during the selection process and the need for more CAHWs were brought. Most importantly was the insistence of respondents on the need for recognition and accreditation of the CAHWs. Respondents were also keen on enhancing CAHWs' training, equipment and monitoring.

Finally, respondents in Marsabit tended to think the selection process was "good" so that there was no need of any improvement. Especially they highlighted they were "very happy" with the fact that they did not have to pay each time they required the CAHWs services as well as by not having to pay for transport to Marsabit to buy drugs. However the majority stated the need and availability for more cheap drugs and on giving refresher courses or retraining of the CAHWs.

Impact and sustainability

All respondents in the three districts unanimously thought CAHWs "are useful". Reasons for that slightly varied between locations (table 20).

West Pokot	Wajir	Marsabit
Animal treatment 54.2%	Drug availability & price 50.7%	Animal treatment 51.4%
Drug availability 37.5%	Access to services 43.5%	Extension 44.1%
Access to services 34.7%	Animal treatment 30.4%	Drug availability 35.3%

Table 20: Reasons why CAH systems are useful – LK group (frequency in %)

When asked about "health improvements" seen in the community, all districts respondents coincided on the "reduction of death rates and animal sickness" due to CAHWs' presence. The decrease in disease incidence concentrated mainly on tick-borne infections control and worm control. Hence followed an increase in animals' body condition and production (milk specially) and reproductive levels. As one of the respondents mentioned, the "health improvements" noticed were an "increase in livestock production, and this has improved our means of survival as livestock is our main source of livelihood".

All districts agreed that CAHWs could have been more effective had it not been for the lack of training or lack of supplies (65.3% West Pokot, 66.1% Wajir, 53.5% Marsabit).

For West Pokot, the main reason was the lack of drugs (85.1%) followed by lack of training or refresher courses (12.5%) (see table 21). It should be noted that respondents thought that CAHWs who had previously been drug sellers performed better in terms of replenishing the drug kit as they had previous knowledge of supply networks. Improvements suggested were mainly "to be paid a salary" by the government or the NGO as it would "make the job more interesting" (36.1%) and to increase drug availability and variety (including human drugs) (34.7%). Increasing means of transport and giving more refresher courses were also stated (33.0% and 27.7% respectively), the two to be funded by the government and/or the NGOs. Regarding refresher courses, it was suggested they focus on animal health and marketing to be performed one week, twice a year. It was also mentioned the training of more CAHWs (19.4%) and the construction of a drugstore nearby so that

drugs are more readily available (12.5%), again to be funded by the government and/or the NGO. One suggestion on financing was to engage the CAHW in the financing of the drugstore for involvement in the maintenance. Finally were stated the provision of equipment (11.1%) (especially cooling boxes and dipping facilities) and the supervision of the CAHWs (5.5%). Other suggestions, although there was less consensus, for improving the system were (i) to give more extension to livestock keepers, (ii) the government to provide assistance to CAHWs, (iii) recognition of CAHWs by the government, (iv) the GoK to eliminate black market or quacks and (v) to create a lab in the area, (vi) the supply of drugs free of charge, (vii) the ability to sell small quantities of drugs so that they are affordable for the livestock keeper and finally (viii) the donor to give the first kit on a loan or refund basis.

The same pattern could be drawn for Wajir, with 89.7% agreeing on lack of drugs as the main problem, and shortage of skills or training in 23.1% of the respondents' answers. Consequently, improvements suggested were the supply of enough and cheap drugs (on a loan basis) (61.0%) and the provision of regular training or refresher courses (55.9%). Providing incentives for the CAHWs to continue working was also highlighted, the incentives being (i) the provision of salaries or wages by the NGO, the government or a combination of both (16.9%), (ii) obtaining some margin from drug selling, (iii) to be given animals, (iv) rewarding CAHWs to encourage competition and (v) the contribution of the community to CAHWs welfare. Other improvement suggestions related to the increase in the means of transport (13.5%) and the regular follow up or monitoring of the workers (11.9%). Provision of accreditation or certification of the CAHWs was also mentioned (10.2%). Other suggestions mentioned fewer times were (i) reviving the Pastoral Association (PA) management (6.7%) by extending membership to all community members and evaluate and monitor the PA progress through regular general meetings, (ii) training of more CAHWs, (iii) provision of more equipment, (iv)

creation of a lab in the area, (v) research on livestock diseases of the area and (vi) reduction of political interference from the chief.

Interestingly, Marsabit respondents mentioned similar levels for lack of drugs (58.1%) and lack of skills or knowledge (54.8%). Therefore improvements suggested by the interviewees were the increase of drug supply (72.4%), the construction of a drug store nearby (53.4%), the provision of means of transport (46.5%) and the provision of refresher courses (43.1%). The salary issue was again mentioned (34.5%) (to be supplied by the NGO and/or the government) as well as the training of more CAHWs (17.2%). Other suggestions, which were given less emphasis, were the provision of equipment and loans for drugs.

West Pokot	Wajir		Marsabit	
Lack of drugs 85.1%	Lack of drugs	89.7%	Lack of drugs	58.1%
Lack of training/refresher courses 12.5%	Lack of skills	23.1%	Lack of skills	54.8%

Table 21: Reasons why the CAH system did not work – LK group perspective

Reasons for leaving the CAHW job were mostly related to the above suggestions. In West Pokot, lack of drugs (16.7%), lack of profits (16.7%), lack of salary (15.3%) and drugs earnings misuse (15.3%) (specially because of drunkenness) were mentioned. Lack of transport (11.1%) and commitment (9.7%) were also highlighted. However other reasons were stated such as insecurity, drought, migration, competition with black market, bad relations with community - especially with elders - and drunkenness. In Wajir reasons for workers to quit were similar to the ones in West Pokot, hence lack of salary (33.9%) and lack of drugs (20.3%) were the two most mentioned reasons, followed by migration (13.6%), lack of incentives or profits (11.7%), travelling distances (6.8%) and finally lack of payment of services by the livestock keepers (6.8%). Other less mentioned reasons were similar to the ones obtained in West Pokot, especially regarding insecurity, black market, political interference and misuse of funds. In Marsabit most of the respondents were not

aware why the CAHWs were quitting. However, the main reasons stated were lack of money (12.1%), lack of drugs (8.6%) and that they "found another job" (5.2%). Transport, unwillingness from pastoralists to pay for the drugs, family matters and migration were other stated reasons.

Incentives for CAHWs to continue working were similar across the districts (see table 22), salary or money given being the most suggested (75.0% in West Pokot, 42.4% in Wajir and 81.0% in Marsabit). In second position came availability of cheap drugs for Wajir and Marsabit (33.9% and 67.2% respectively) and provision of means of transport for West Pokot (37.5%). Third positioned was availability of drugs for West Pokot (34.7%), training and refresher courses for Wajir (22.0%) and adequate transport for Marsabit (60.3%). Fourth incentive in West Pokot were refresher courses and advice from professional staff (13.9%), followed by supervision and monitoring from private veterinarians or NGOs, construction of drugstores for drug availability, good relations between community members, livestock keepers and CAHWs, recognition from government and NGOs of CAHWs and creation of co-operatives and associations. Other recurrent themes as prohibition of the black market, increase equipment and materials and loans for drug-buying were also mentioned. For Wajir, fourth came the increase in margin profit from drug selling (16.9%), followed by recognition of CAHW status through certificates (13.6%), enhanced supervision from NGO or government staff (10.2%), provision of transport (6.8%) and the creation of a community contribution for livestock levy (6.8%). Other suggestions considered as incentives in Wajir were the sensitisation of the community to pay for the services they are given, provide CAHWs animals as an incentive to continue working, provide kits and drugstores and create an association of CAHWs. Finally for Marsabit, the fourth incentive mentioned was the construction of drugstores so as for drugs to be readily available to community members when needed (43.1%). As in the previous districts, the provision of refresher courses

(22.4%) and equipment (15.5%), training more CAHWs (12.1%) and giving loans for drug buying (5.2%) was highlighted.

West Pokot	Wajir	Marsabit
Salary / economic 75.0%	Salary / economic 42.4%	Salary / economic 81.0%
Provision of means of transport 37.5%	Availability of cheap drugs 33.9%	Availability of cheap drugs 67.2%
Availability of cheap drugs 34.7%	Training and refresher courses 22.0%	Provision of means of transport 60.3%

Table 22: Incentives for CAHWs - LK group

In all three districts respondents had learnt from CAHWs (table 23) (65.3% in West Pokot, 98.3% in Wajir and 100% in Marsabit). In West Pokot the most common themes been taught to community members were dosages and ways of administration of drugs (51.1%) - including injection-, dipping and spraying (29.8%), treatment of specific disease (21.3%), early reporting of cases of disease (21.3%) to the CAHWs and diagnostic of specific disease symptoms (8.5%). Others were extension on the importance of vaccination, differences between human and animal drugs, animal nutrition, drug storage, usefulness of quarantines and knowing when a drug is expired. Finally were taught basic procedures such as castration and de-horning. In Wajir livestock keepers were taught about drug dosages and ways of administration (96.5%) -including injection-, treatment of specific diseases (29.8%), early disease detection (19.3%), information on disease prevention (19.3%) and of diseases of the area (10.5%). Extension was also given on distinguishing fake and expired drugs (10.5%), on animal husbandry, on the importance of accurate drug-dosing, on the importance of vaccinations, and on disease reporting. Finally in Marsabit community members were also taught on dosages and ways of drug administration (86.2%), hygiene and public health education was an important component (36.2%) which has been rarely mentioned in other districts. This included the "covering of food after cooking" and the hygiene of the house and the animals' locations. Still in the public health extension, special attention was also given to advising livestock keepers on not drinking milk or eating meat of an animal

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that has recently been treated, on how to bury the carcasses of animals which died

of Anthrax, on not eating dead animals, on burning dirt, on boiling water and on

flies and mosquitoes control. Clinical animal treatment was stated in 34.5% of the

answers.

West Pokot	Wajir	Marsabit
Dosages and administration routes 51.1%	Dosages and administration routes 96.5%	Dosages and administration routes 86.2%
Dipping /spraying 29.8%	Treatment of specific diseases and early reporting 29.8%	Hygiene and public health education 36.2%
Treatment of specific diseases and early reporting 21.3%	Disease prevention 19.3%	Treatment of specific diseases 34.5%

Table 23: Extension messages to community members by CAHWs – LK group

• **Policy makers group**

Selection process

As mentioned in the descriptive chapter, 60.7% had field experience of different

length. From those having experience, in 82% of the cases it was in Kenya (different

districts). Only 2 of them (11.8%) had had field experience exclusively outside

Kenya (Sudan and Zimbabwe). Most of the interviewees with field experience had

spoken with a CAHW while in the field. However 2 of them, with field experience in

Kenya, had never been in contact with a CAHW and 3 (17.6%) had spoken to AHAs or

"vet scouts" as an alternative.

As regarding the policy makers' interpretation of the role of CAHWs, respondents

with field experience agreed it was "disease reporting and link person" (94.1%) and

"delivering animal health services in ASAL areas where there is no other qualified

professional" (including preventive medicine and simple curative treatments)

(88.2%). Some of the respondents highlighted however that services given by CAHWs

should exclusively focus on epidemiological surveillance and not on curative or

clinical services. Other roles suggested were (i) extension (on feed and marketing of

products) (17.6%), (ii) record keeping (5.9%), (iii) production improvement (5.9%), and (iv) supplementing government services (5.9%).

Regarding how the selection process was done, 35.3% of the respondents with field experience stated the authorities or the government selected the CAHWs (the "chief of the village" being the authorities, and the DVO being the government). In 41.2% of the cases it was the elders or opinion leaders who appointed the candidate/s. In fewer cases (11.8%) the communities and the NGOs were involved in the process. Only one respondent, although having field experience, did not know how the selection process was done. Strengths of the selection process were only highlighted when the community (with or without NGO presence) was involved. It was stressed that the strength was the "involvement of the community in the selection process". They mentioned this process would enable communities to select candidates they "trust" (linking with the "ideal" qualities above stated) and who are "motivated to work". However, when the elders or the authorities selected candidates, only weaknesses were mentioned. These were mainly that the effectiveness of the system was hindered as elders tended to select their relatives. Other reasons included the following: (i) the selected candidates were illiterate, (ii) there were no women candidates, (iii) the selected person was not accepted by the community, (iv) the process was not participatory so the community did not know what the purpose of the project was, (v) mistrust, and (vi) the "business orientation" of the process. When the NGO was involved, the weakness often mentioned was the "dependency syndrome" from the community towards the NGO.

When asking the group of interviewees without field experience (10), 70% of them thought the whole community should be involved in the selection process as opposed to involving exclusively opinion leaders or elders. They mentioned also the importance of integrating field NGOs in the process so that the CAH system would be more likely to be sustainable. However, 2 out of 10 stated it was the role of the

authorities to determine the CAHW selection and thought preference should be given to diploma holders (AHA). Only one of the respondents of the group of policy makers without field experience thought the selection should be done in conjunction with elders and NGOs.

Interviewees with field experience had rarely seen women involved either in the selection process or as candidates. However they all generally agreed on that their involvement should be enhanced as they are available most of the time and are in contact with the animals.

When asked about the usefulness of the CAH system, all respondents with the exception of 2 thought it was useful. Reasons mentioned were that CAHWs fill the gap of service delivery in pastoral areas as they are available in the community, can live and work in harsh areas and follow nomadic communities. However, reluctance and scepticism in some of the answers could be noted, mentioning that the best alternative to deliver the services would be the veterinarian. A recurrent theme was the strong need for supervision and control of CAH systems as well as good quality training.

6 out of 28 (21.4%) stated a contradiction existed between the will of the communities and that of private veterinarians in terms of service delivery to poor farmers. Main reasons being that (i) the private veterinarian services are too expensive for poor livestock keepers' affordability, (ii) community members do not differentiate quality services, (iii) literacy in CAHWs being a primary request from private veterinarians is not always fulfilled and finally (iv) the "work of the private veterinarian is taken over by the CAHW". However the rest (78.6%) thought there is a link between the two actors basing their reasoning in the objective of increasing service delivery to dryland areas, and that private veterinarians are interested in profit making. It was also mentioned the concerns regarding the economic viability

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of the system as workers do not always understand the purpose of profit making and drug kit replenishment.

Finally, suggestions and remarks given by the interviewees varied and did not only cover selection process but also other issues. Therefore livestock keepers' access to markets and slaughterhouses was raised as well as concerns regarding the viability of the system. The latter referred to the presence of black market for drugs where these are found at cheaper price, hence continuing to be of interest for CAHWs. Centring more in the selection process, it was repeatedly mentioned the need for women's involvement and the need for supervision and training of CAHWs. Finally was suggested the suppression of NGOs in ASAL areas as they are "undermining the economic viability of CAH systems". Some respondents also insisted on the veterinarians to be paid by the government to work in those areas.

Impact and sustainability

When asked about the main reasons why CAHWs were leaving, 42.9% stated the problem was economic (lack of salary or payment). The same level of attention was given to issues relating to drug kit replenishment and drug availability (42.9%). Disagreements with the community, finding other activities and donor-driven problems were given the same level of importance (32.1%). Other suggested causes were infrastructure (17.9%), lack of commitment (17.9%), failure in the selection process (10.7%), lack of supervision (10.7%), family matters (7.1%), lack of good training (7.1%) and institutional support (3.6%) and finally drunkenness (3.6%).

Incentives, from policy makers' point of view, to encourage CAHWs to continue working were mainly of economic origin (71.4%). Social status or recognition of their work by the community and /or government was also highly ranked (46.4%). Enhanced amenities such as water access, roads and security were mentioned as incentives (17.8%), as well as the availability and regular supply of drugs (17.8%).

Finally came refresher courses (10.7%), means of transport and equipment (10.7%) and in kind presents like animals to be given by the community (3.6%).

Most (42.8%) of the policy makers interviewed did not know what CAHWs did after quitting the community work. The remaining however suggested few alternatives, the most popular being returning to be a livestock keeper (46.6%) followed by opening a duka or agrovet (33.3%) and going for further training (26.6%). Other suggestions were turning to the black market becoming an illegal drug seller (20%), migration to towns in search of higher wages, and livestock trade.

Policy makers thought a livestock keeper would be more interested to go to a CAHW instead to another supplier of similar services due mainly to their availability (53.6%) and to the low prices and flexibility of payment methods (46.2%). Other answers were the understanding of the local culture, lack of other alternatives, because of the quality of the drugs, trust, respect and follow up of the animals.

Regarding their perceptions of who these "other suppliers of services" were, the majority (64.3%) stated the black market or illegal drug sellers[62], followed by (53.6%) agrovets or dukas (shopkeepers). It was however noted these could only be considered competitors in terms of drug selling, as they do not deliver other services. Black market and illegal drug sellers were considered as a "threat" in 46.4% of the answers as they sell (bad quality) cheaper drugs, hence increasing drug selling competition. The issue of "bad quality drugs" was linked to the lack of ethics (a desired quality mentioned in the ranking) of drug sellers as opposed to these of veterinarians or AHAs. Black market competition had different origins as reported by respondents. These could either be from the borders (Somalia, Southern Sudan...) or from private veterinarians or government officials buying drugs in Nairobi at cheaper price and re-selling them to the quacks. Relating to agrovets and

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[62] Illegal drug sellers and black market do not include, for the purpose of this study, agrovets and dukas even if it could be argued that they might also be considered as illegal if not supervised by a veterinarian. Illegal drug sellers include quacks and peddlers.

dukas it was noted their competitive advantage of selling also human drugs so that it "makes it easier for the livestock keeper to buy there". Government veterinarians (46.4%) – as the government has the infrastructure and facilities - and AHAs (46.4%) were also considered as alternatives to CAHWs. Less mentioned ones were traditional healers (21.4%), livestock keepers and traders themselves (17.8%), and NGOs (14.3%). Interestingly, human medical professionals and chemists were also mentioned (10.7%) as well as pharmaceutical industries (7.1%). Pastoral associations, production industry and church organisations were the least recorded. Statements were made against CAHWs such as "(CAHWs) are also illegal but they will disappear after the new government because it will enforce the law". Others insisted that "the country can afford health services to livestock and men so that services are available there". It was also suggested the creation of a drug Inspectorate for law enforcement. However others thought community workers could be a solution to reduce public health concerns regarding drug residues in milk and meat. One mentioned solution was to train these quacks or peddler so as they sell quality drugs. Supervision and good quality training of CAHWs was commonly agreed.

Proposed solutions from policy makers to counteract the competition problem referred mainly to educating communities about the concept of "quality" (28.6%) and on the supervision by veterinarians and/or AHA of CAHWs (28.6%). This was followed by the creation of a drug Inspectorate allowing only veterinarians (private or from the government) to sell drugs (17.9%). Enforcement of the law and enhancing economic or business capacity of CAHWs were given the same importance (14.3%). Liberalisation of the market and training of quacks to become CAHWs were also given the same weight (7.1%). This was followed by other suggestions such as (i) institutional change, (ii) banning government veterinarians from selling drugs, (iii) creation of farmers' organisations, (iv) accreditation of shops through logos, (v) recognition of CAHWs in the Veterinary Surgeons Act, (vi) registration of dukas by

KVB, and (vii) improve infrastructure. Finally it was suggested that private veterinarians should exclusively work on clinical treatments whereas the government officials should exclusively concentrate on surveillance.

When asked about which kind of support should be given to CAH systems, 67.9% mentioned the government and 57.1% the private veterinarians. Government support focused mainly on "training and retraining" (26.3%) as well as institutional support through recognition and certificates (15.8%). Supervision of the workers was stated in 10.5% of the answers related to government support. Other suggestions were lending money to private veterinarians, to the communities and finally to provide drug supply (5.3% each). Regarding private practitioners support, it focused mainly on supervision (25%), on drug supply (18.8%) and on "training and retraining" (12.5%). In 10.7% of the cases it was stated the NGO should be supporting the systems but functions were not specified.

Suggestions for CAH system improvement coincided, in 32.1% of the interviewees answers, in a structure whereby CAHWs would be supervised either directly by the vet or by the AHA (who in turn would be supervised by the vet). Veterinarians would then be supplying drugs and training to CAHWs and AHAs. Further comments on the sustainability and effectiveness of CAH systems were raised and included taking a uniform approach to CAH systems, empowering farmers, improving productivity, enabling access to markets and monitoring of the systems. Few of the interviewees pointed out however concerns regarding CAH systems' in relation to the OIE (Organisation Internationale des Epizooties) international standards for export of animal and animal products. These referred to the OIE standards being "too high" for developing countries to access international markets and that bilateral agreement between countries could be a possible solution for exporting animals and animal products. Concerns were raised regarding CAHWs roles in that matter.

When relating respondents' groups to the "ideal" qualities of community workers, preferences in qualities could be observed. Hence government officials tended to highlight literacy and trust as the main qualities (83.3% and 52% respectively), whereas academics stated "literate" and "knowledgeable" (77.7% and 66.7% respectively), KVA/B members "ethnicity to the area" with 75%, and availability and trust with 50%, and finally private sector respondents gave more importance to the ethnicity or "knowledge of the area" (60%) and to training (60%). Trends in highlighting qualities for each group were the following:

Government	Academic	KVA/B	Private
Literacy	Literacy	Ethnic to the area	Knowledgeable / Ethics
Trust	Knowledgeable	Knowledgeable	
Knowledgeable	Availability/Commitment	Availability/Trust/Literacy	

Table 24: Quality preferences in relation to group belonging- PM group

Tendencies were also found in relation to groups of field experience and policy involvement. Hence, respondents with field experience (with or without policy involvement) tended to highlight qualities such as "ethnicity to the area", "knowledgeable". Those with policy involvement (either with or without field experience) focused their preferences on "trust", "commitment", and "ethics". The group of respondents most interested in the CAHW being "qualified" (62.5%) was that where respondents had no field experience but were involved in policy related activities (62.5% - 5 out of 8 - of these group being members of KVA/B). "Literacy" and "social" were mentioned in 2 of the groups, namely the two extreme groups: with the two experiences (group made of 35.7% government officials and 28.6% KVA/B members) - 71.4% for "literacy" and 28.6% for "social-, and without experience in either subject (all academics) - 66.7% for each quality. "Knowledgeable/training" and "ethnic to the area" were highly rated in every group.

No field experience and no policy involvement (n=3)	No field experience but policy involvement (n=8)	Field experience and no policy involvement (n=3)	Field experience and policy involvement (n=14)
Knowledgeable	Qualified Knowledgeable	Knowledgeable Ethnic of the area	Ethnic of the area
Literate Ethnic of the area Social/PR	Available/ Trustworthy		Knowledgeable
	Literate		Trustworthy/ Committed

Table 25: Quality preferences in relation to field experience and policy involvement – PM group

Annex 7 - Pearson correlation results

- ## Livestock keepers sub-groups correlations

Correlations

Variables	Statistics	West Pokot	Wajir	Marsabit	West Pokot male literate	West Pokot male illiterate	Wajir male literate	Wajir male illiterate	Marsabit male literate	Marsabit male illiterate	West Pokot women	Wajir women	Marsabit women
West Pok	Pearson Correlation	1.000	.399	.460*	.880*	.906*	.554*	.195	.338	.144	.386	.664*	.177
	Sig. (2-tailed)	.	.090	.048	.000	.000	.014	.423	.157	.557	.102	.002	.469
	N	19	19	19	19	19	19	19	19	19	19	19	19
Wajir	Pearson Correlation	.399	1.000	.617*	.514*	.429	.939*	.938*	.754*	.557*	.351	.845*	.593*
	Sig. (2-tailed)	.090	.	.005	.024	.067	.000	.000	.000	.013	.141	.000	.007
	N	19	19	19	19	19	19	19	19	19	19	19	19
Marsabit	Pearson Correlation	.460*	.617*	1.000	.365	.509*	.592*	.567*	.845*	.570*	.318	.591*	.744*
	Sig. (2-tailed)	.048	.005	.	.124	.026	.008	.011	.000	.011	.184	.008	.000
	N	19	19	19	19	19	19	19	19	19	19	19	19
West Pok male literate	Pearson Correlation	.880*	.514*	.365	1.000	.645*	.713*	.251	.321	.091	.465*	.659*	.153
	Sig. (2-tailed)	.000	.024	.124	.	.003	.001	.301	.180	.710	.045	.002	.532
	N	19	19	19	19	19	19	19	19	19	19	19	19
West Pok male illiterate	Pearson Correlation	.906*	.429	.509*	.645*	1.000	.484*	.321	.353	.159	.337	.727*	.202
	Sig. (2-tailed)	.000	.067	.026	.003	.	.036	.181	.138	.515	.158	.000	.408
	N	19	19	19	19	19	19	19	19	19	19	19	19
Wajir mal literate	Pearson Correlation	.554*	.939*	.592*	.713*	.484*	1.000	.761*	.682*	.446	.522*	.841*	.452
	Sig. (2-tailed)	.014	.000	.008	.001	.036	.	.000	.001	.055	.022	.000	.052
	N	19	19	19	19	19	19	19	19	19	19	19	19
Wajir mal illiterate	Pearson Correlation	.195	.938*	.567*	.251	.321	.761*	1.000	.733*	.598*	.137	.745*	.661*
	Sig. (2-tailed)	.423	.000	.011	.301	.181	.000	.	.000	.007	.577	.000	.002
	N	19	19	19	19	19	19	19	19	19	19	19	19
Marsabit male literate	Pearson Correlation	.338	.754*	.845*	.321	.353	.682*	.733*	1.000	.833*	.239	.600*	.850*
	Sig. (2-tailed)	.157	.000	.000	.180	.138	.001	.000	.	.000	.324	.007	.000
	N	19	19	19	19	19	19	19	19	19	19	19	19
Marsabit male illiterate	Pearson Correlation	.144	.557*	.570*	.091	.159	.446	.598*	.833*	1.000	.039	.304	.800*
	Sig. (2-tailed)	.557	.013	.011	.710	.515	.055	.007	.000	.	.875	.205	.000
	N	19	19	19	19	19	19	19	19	19	19	19	19
West Pok women	Pearson Correlation	.386	.351	.318	.465*	.337	.522*	.137	.239	.039	1.000	.317	.035
	Sig. (2-tailed)	.102	.141	.184	.045	.158	.022	.577	.324	.875	.	.186	.888
	N	19	19	19	19	19	19	19	19	19	19	19	19
Wajir women	Pearson Correlation	.664*	.845*	.591*	.659*	.727*	.841*	.745*	.600*	.304	.317	1.000	.365
	Sig. (2-tailed)	.002	.000	.008	.002	.000	.000	.000	.007	.205	.186	.	.124
	N	19	19	19	19	19	19	19	19	19	19	19	19
Marsabit women	Pearson Correlation	.177	.593*	.744*	.153	.202	.452	.661*	.850*	.800*	.035	.365	1.000
	Sig. (2-tailed)	.469	.007	.000	.532	.408	.052	.002	.000	.000	.888	.124	.
	N	19	19	19	19	19	19	19	19	19	19	19	19

*.Correlation is significant at the 0.05 level (2-tailed).

**.Correlation is significant at the 0.01 level (2-tailed).

Correlations

		West Pokot	Wajir	Marsabit	West Pokot men	Wajir men	Marsabit men	West Pokot women	Wajir women	Marsabit women
West Pokot	Pearson Correla	1.000	.500*	.165	.846*	.425	.335	.702*	.608*	.069
	Sig. (2-tailed)	.	.029	.499	.000	.070	.161	.001	.006	.778
	N	19	19	19	19	19	19	19	19	19
Wajir	Pearson Correla	.500*	1.000	.463*	.454	.964*	.626*	.439	.876*	.526*
	Sig. (2-tailed)	.029	.	.046	.051	.000	.004	.060	.000	.021
	N	19	19	19	19	19	19	19	19	19
Marsabit	Pearson Correla	.165	.463*	1.000	.208	.544*	.774*	.138	.344	.960*
	Sig. (2-tailed)	.499	.046	.	.393	.016	.000	.574	.149	.000
	N	19	19	19	19	19	19	19	19	19
West Pokot me	Pearson Correla	.846*	.454	.208	1.000	.399	.460*	.386	.664*	.177
	Sig. (2-tailed)	.000	.051	.393	.	.090	.048	.102	.002	.469
	N	19	19	19	19	19	19	19	19	19
Wajir men	Pearson Correla	.425	.964*	.544*	.399	1.000	.617*	.351	.845*	.593*
	Sig. (2-tailed)	.070	.000	.016	.090	.	.005	.141	.000	.007
	N	19	19	19	19	19	19	19	19	19
Marsabit men	Pearson Correla	.335	.626*	.774*	.460*	.617*	1.000	.318	.591*	.744*
	Sig. (2-tailed)	.161	.004	.000	.048	.005	.	.184	.008	.000
	N	19	19	19	19	19	19	19	19	19
West Pokot wor	Pearson Correla	.702*	.439	.138	.386	.351	.318	1.000	.317	.035
	Sig. (2-tailed)	.001	.060	.574	.102	.141	.184	.	.186	.888
	N	19	19	19	19	19	19	19	19	19
Wajir women	Pearson Correla	.608*	.876*	.344	.664*	.845*	.591*	.317	1.000	.365
	Sig. (2-tailed)	.006	.000	.149	.002	.000	.008	.186	.	.124
	N	19	19	19	19	19	19	19	19	19
Marsabit wome	Pearson Correla	.069	.526*	.960*	.177	.593*	.744*	.035	.365	1.000
	Sig. (2-tailed)	.778	.021	.000	.469	.007	.000	.888	.124	.
	N	19	19	19	19	19	19	19	19	19

*.Correlation is significant at the 0.05 level (2-tailed).

**.Correlation is significant at the 0.01 level (2-tailed).

- **Policy makers sub-groups correlations**

Correlations

		Goverment	Private Sector	KVA KVB	Academic	Field Experience	No Field Experience	Policy Involvment	No Policy Involvement
Goverment	Pearson Correla	1.000	.267	.443	.568*	.901*'	.429	.817*'	.224
	Sig. (2-tailed)	.	.270	.058	.011	.000	.067	.000	.357
	N	19	19	19	19	19	19	19	19
Private Sector	Pearson Correla	.267	1.000	.625*'	.339	.485*	.583*'	.548*	.449
	Sig. (2-tailed)	.270	.	.004	.156	.035	.009	.015	.054
	N	19	19	19	19	19	19	19	19
KVA KVB	Pearson Correla	.443	.625*'	1.000	.694*'	.637*'	.921*'	.860*'	.388
	Sig. (2-tailed)	.058	.004	.	.001	.003	.000	.000	.101
	N	19	19	19	19	19	19	19	19
Academic	Pearson Correla	.568*	.339	.694*'	1.000	.771*'	.776*'	.777*'	.744*'
	Sig. (2-tailed)	.011	.156	.001	.	.000	.000	.000	.000
	N	19	19	19	19	19	19	19	19
Field Experience	Pearson Correla	.901*'	.485*	.637*'	.771*'	1.000	.583*'	.910*'	.455
	Sig. (2-tailed)	.000	.035	.003	.000	.	.009	.000	.050
	N	19	19	19	19	19	19	19	19
No Field Experier	Pearson Correla	.429	.583*'	.921*'	.776*'	.583*'	1.000	.811*'	.555*
	Sig. (2-tailed)	.067	.009	.000	.000	.009	.	.000	.014
	N	19	19	19	19	19	19	19	19
Policy Involvment	Pearson Correla	.817*'	.548*	.860*'	.777*'	.910*'	.811*'	1.000	.360
	Sig. (2-tailed)	.000	.015	.000	.000	.000	.000	.	.130
	N	19	19	19	19	19	19	19	19
No Policy Involve	Pearson Correla	.224	.449	.388	.744*'	.455	.555*	.360	1.000
	Sig. (2-tailed)	.357	.054	.101	.000	.050	.014	.130	.
	N	19	19	19	19	19	19	19	19

*.Correlation is significant at the 0.05 level (2-tailed).

**.Correlation is significant at the 0.01 level (2-tailed).